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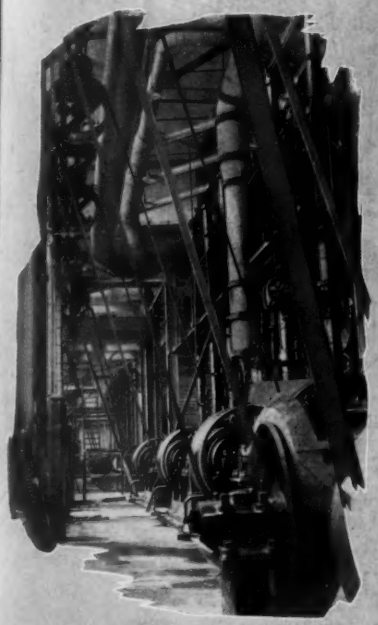

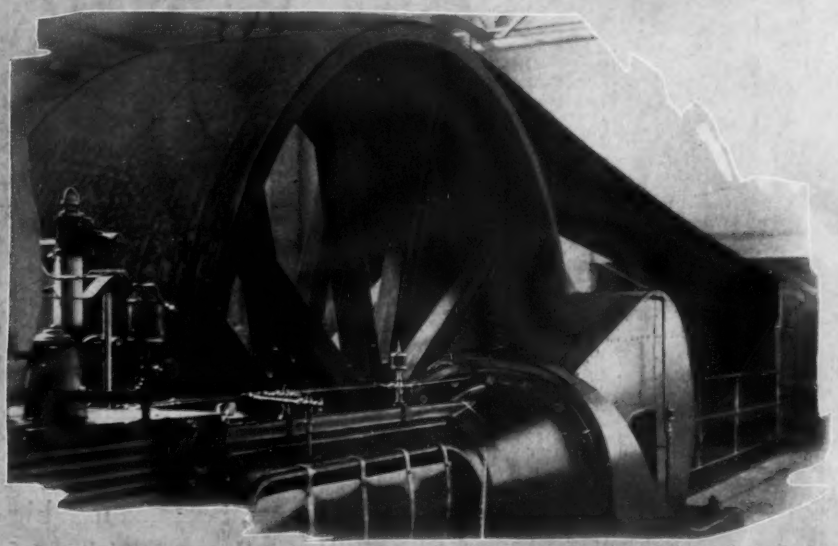

The above picture is one of five Chicago Belting 3-ply Reliance main drive belts each of which is 72 inches wide, in five mills in one plant of a large cement mill. These belts were installed in 1904 and in the opinion of their superintendent are in good condition today with years of service ahead of them. So far they have lasted 21 years. In the cement industry one out of every two plants in the United States are extensive users of Chicago Belting belts.

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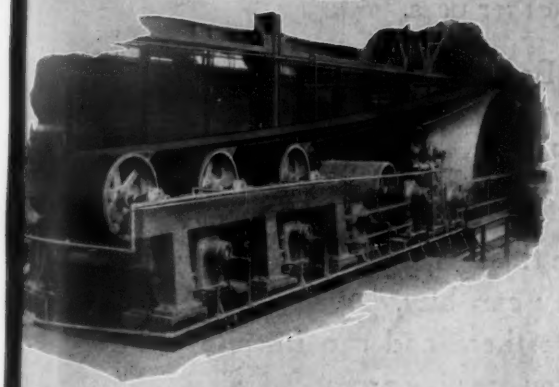

(Upper Picture) Chicago Belting Sea Lion belts on wet end of a paper machine in one of the big paper mills. In the pulp and paper industry where production is all important, Chicago Belting belts are used extensively.

(Lower Picture) This is a picture of the interesting Morgan Drive in the steel industry. The four big belts going over one pulley are all Chicago Belting Reliance brand 3-ply belts. Most of the large manufacturers of steel in the United States are regular users of Chicago Belting belts.

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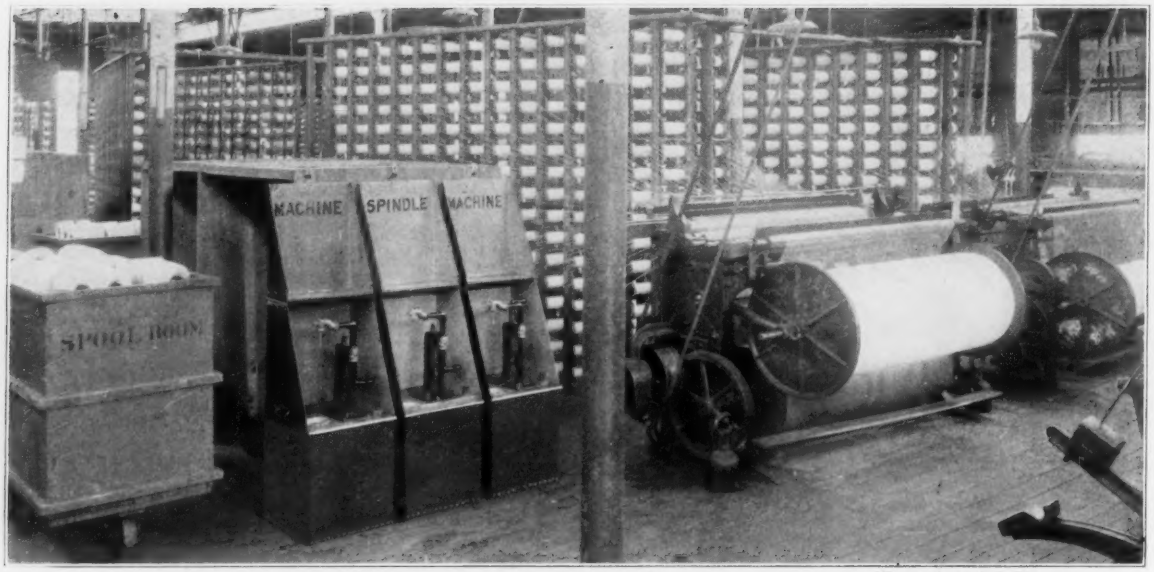

*(Departmental Storage—
Appleton Mills, Lowell, Mass.)*

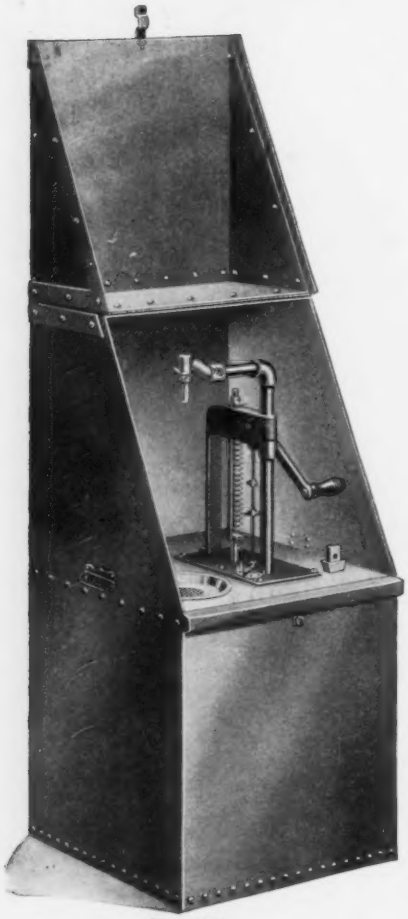

Fig. 172
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COTTON

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When changing address, notify us, not the postmaster. Always give the old address as well as the new one.

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With the Publishers—

The Pearl and the Textile Men

There would be no pearls, the scientists tell us, if the oyster or clam were never irritated. A grain of sand, or some other irritating substance lodges in the opened shell and in defense the mollusk secrets around it the substance which in time makes the valuable gem.

Neither would there be any good operating plans described in COTTON if irritating situations did not arise in textile mills. This may be only another way of repeating the proverb that "necessity is the mother of invention," which only serves to emphasize the fact that there is always some sort of a necessity facing most mill superintendents. That is a condition which cannot be escaped for this is an age of progress, and progress is, as Havelock Ellis, the philosopher and psychologist said, "the exchange of one nuisance for another nuisance." Cotton mills can hardly stand still successfully—they either go forward or backward. Things change too rapidly these days for suspended motion.

COTTON does not claim that the information which it offers in each issue—as recent as it is, and as valuable as it is—will settle all mill problems.

"Nothing is going to be settled in the sense in which things were once supposed to be settled, for the simple reason that knowledge will probably continue to increase and will inevitably alter the world with which we have to make terms," said James Harvey Robinson, in his "The Mind in the Making."

Think how much more rapidly ideas spread in these days. This spread is due to the automobile, the movies, the radio, newspaper syndicates, more everready pencils, fountain pens and portable typewriters. And anything that changes the habits of the American people eventually affects the industries that turn out the things people use. For example, think how the bathing suit market has multiplied.

In view of these constantly changing conditions, the work of COTTON in telling textile men the latest developments in the industry becomes more important. We are not so much occupied with recording the habits that call for different methods of production and changing volumes, as we are in showing exactly how mills are operating under the newest conditions.

Some new idea becomes national overnight, almost, and soon there is a change in the work which the textile mill must do—the irritation has set in that will produce a good plan from some place in the field.

This fact that nothing is going to be settled in the old sense is fully recognized by the manufacturers of equipment and supplies. These business concerns realize that with all the facilities for the dissemination of increasing knowledge, there is no better medium than the advertising pages of COTTON for reaching the men who must make such changes in the textile world. They use these pages to tell what their products have done and will do for the mill that faces a difficult situation.

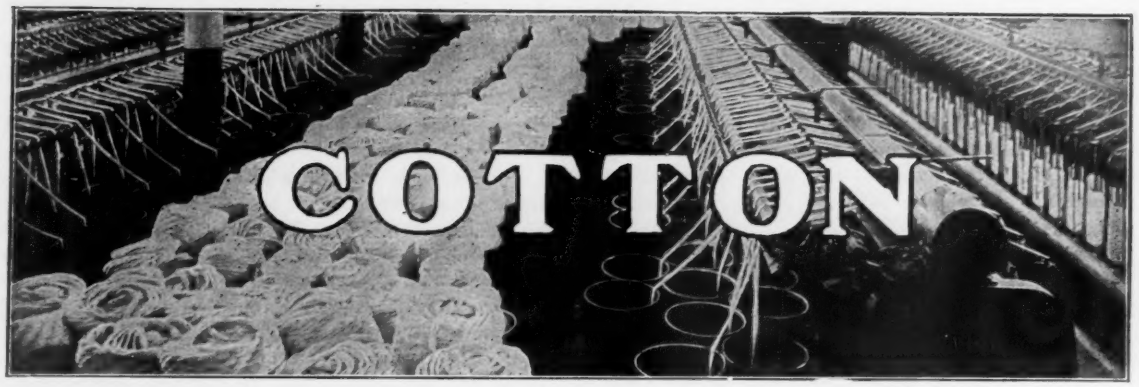
The publishers of COTTON and its advertisers realize the need for constant application to the problems of textile mills. As an editorial writer in Colliers remarked: "Work will never again be done on the old small scale. The world has drawn together, and the needs and products of mankind now meet across oceans and throughout whole continents. The things we do at bench or desk are part of the unseen activities of workers like ourselves on the other side of the earth."

AMONG COTTON'S READERS

James A. Chapman, Jr.,
Vice-President and Superintendent
Inman Mills, Inman, S. C.
Past President, Southern Textile Association

"I think it would be impossible for me to keep up without reading COTTON, as I receive great benefit from both the articles and advertisements which appear in it. I encourage all my key-men to read COTTON as I think it is time well spent."

Jas A Chapman Jr



February, Nineteen-Twenty-Five

Our Trade With Other Lands.

Henceforth the foreign trade factor will be a most important one affecting American business as a whole, as it has been practically since the beginning of the World War. The factor no longer bears pertinently on only those branches of industry and trade directly concerned but upon nearly all. The speeding up of American industry to the point where normal operations result in a large net surplus production, changes made by the war in world finances and trade, our growing dependence on foreign lands for many essential raw products and perhaps a lessening dependence of others on us for raw products—all accentuate the importance of the factor. Yet insofar as the deep economic phases of the factor go we still are babes in the wood in despite of the unusual experience we have had with it during the last ten years.

We still maintain the big "favorable" trade balance which used to give us so much pride for but little reason. For the balance only offset what we owed or spent mostly for pleasure abroad; it was more in the nature of a tribute paid than a profit earned. The trade balance in our favor for 1924 was around a billion dollars, proportionately about the same as before the World War; that is, our excess of exports over imports was in about the same ratio as of old. Both exports and imports were considerably greater than before the war. The first amounted to around $4,600,000,000, an increase of 115 per cent compared with the pre-war average. Imports amounted to about $3,575,000,000. Exports increased about 12 per cent over 1923 and imports fell off about 5 per cent.

When foreign trade is calculated in money terms the results can be misleading because of the changed value of currency. In terms of volume our exports in 1924 represented an increase of only about 22 per cent over the pre-war average. This shows a rate of increase greater than that of population and higher than was formerly the rule.

Little of the "favorable" balance now goes for what we owe abroad. Our investments in other lands now exceed those of foreigners in this country, although the latter still are of considerable size. Contrary to the popular notion foreigners have made large investments in the United States even since the war.

In some part, the balance was covered by importations of gold, amounting in 1924 to about $280,000,000—but we already had far more gold, around one-half of the entire world's supply, than we had any use for. Other portions were taken care of by expenditures, much increased, of American travelers abroad and by the remittances of immigrants. The largest portion was covered, and to spare by American investments abroad, amounting to a billion dollars or more. These investments now aggregate around $8,000,000,000 not including war debts owed by other countries to the Government. They entail the collection of a half billion dollars or more a year in interest and dividends. This, together, with a large proportion of our "favorable" trade balance must be taken in goods or be reinvested.

Whether we can maintain our "favorable" trade balance, or even whether it is best that it be maintained indefinitely, is by no means certain. The problem will be accentuated when—if ever—we begin to collect on all of the war debts owed to the Government.

An export trade beyond any we ever enjoyed before the war seems, however, to be essential to a healthy domestic economy in the future. And this carries with it the necessity of buying considerably more from abroad, even though we do not buy so much as to render the trade balance "unfavorable" to us.

The readjustments that are to come may be as far-reaching as those which the foreign trade situation already has produced. Our foreign trade still consists in great part of raw or semi-raw materials. Only about 40 per cent of our exports are of manufactured goods ready for consumption; of our imports only about 20 per cent are made up of such goods. Of manufactures ready for consumption we sold abroad last year about twice the volume that we bought from other peoples.

Cotton still is our largest single item of export, though in both volume and proportion it is far below its pre-war standing. Our exportations of cotton goods, while above the pre-war record, of late have been far below the war record and that of the years immediately following. There was a decline of 6.3 per cent in the exports of cotton cloth during the first nine months of 1924 as compared with the same period of 1923. The imports of cotton cloth fell off even more, 23.1 per cent, while those of cotton laces and embroideries increased 22.6 per cent. Our exports of cotton wearing apparel fell off 17.1 per cent, while imports of this class declined 8 per cent.

Our chief import according to value is cane sugar, the

four succeeding ones being raw silk, coffee, crude rubber and furs.

Of our 25 leading exports only four fell, in 1924, below the pre-war figures. These were raw cotton, kerosene, lumber and refined petroleum.

While there was a gain in foreign trade throughout the world, the United States alone of large countries did more business outside of its own territory, in 1924, than was transacted on the average during the war.

"International trade," says Secretary Hoover of the United States Department of Commerce, "shows a larger movement of commodities during the last year than at any time since before the war. But international exchange of goods, measured in quantities, is probably 10 to 12 per cent below pre-war, although the United States is unique among the large combatant nations in having recovered its foreign trade to a point 15 to 20 per cent above pre-war on a quantity basis."

The fact that European countries made gains last year while we sustained our position shows that world recovery will not necessarily cause the foreign trade of the United States to recede.

Our foreign trade still flows substantially in the same directions followed by it prior to the war. Last year Great Britain continued to be our best customer, with Canada next, Germany third and France fourth. Nearly every country dealt with bought more from us than during the year before.

Now comprising a factor that, more readily than ever before, can determine our domestic prosperity, foreign trade deserves close study by those who do not as well as by those who share in it.

Doubtful Gifts to the States.

An investigator has figured out that there is now paid directly to the various States approximately $145,000,000 a year of United States Treasury funds. These technically are gifts, subsidies, or donations for various purposes, most of them being primarily excellent—public roads, education of special sorts, and such things as the administration of the Federal infancy and maternity act.

Most of it is given on the "fifty-fifty" basis, that is, it is contingent on the States or local communities putting up at least as much for the same purposes, it all being expended more or less under Federal supervision.

Many people think the money thus "given" the States by the Federal Government is of the nature of "something for nothing." And from one point of view a good case can be made out for this conviction. For the Statess do not receive in proportion to their direct payments of Federal taxes but, rather, in ratio to population and other things. Alabama, for example, gets back in direct cash 17.40 per cent of what the people of that State pay the Government in the form of internal revenue taxes. New York gets back less than 1 per cent. Thus it may be made to appear that Alabama and a majority of the States profit, via the Federal Treasury, at the expense of New York and the four or five other of the wealthier States.

This, however, is more apparent than real; for Alabama, as an example, pays in the end a good portion of the taxes collected by the Federal Government in New York—pays them when its people buy goods or otherwise do business with New Yorkers.

Even if it were true that the poorer States could prey on the rich ones in this manner, the flame still would not be worth the candle. For there is involved in the procedure certain principles far beyond any values that can be stated in money.

No one would be in favor of letting the Federal Government hand these "gifts" to the States without strings of any kind upon them. There must be some measure of supervision over them from Washington, which means that for every mess of pottage thus received some portion of the invaluable birthrights of the States and other local government is given in return.

Of course many of the ends served by these "fifty-fifty" appropriations to the States by Congress are in themselves good and there is some virtue in the theory of Federal "stimulation."

But there isn't a State in the Union that shouldn't be too proud to go to Washington a-begging for funds for anything which it should do for itself—and there is none not able to do whatever reasonably needs to be done in the realm of its own exclusive affairs.

The principle in question is involved most pertinently in the so-called National Education Bill behind which a mighty propaganda has been operating for several years and will continue to operate. It would go further and in more delicate directions than any of the similar ventures that function now. And for it the arguments—illiteracy, poor schools, low pay for teachers—are more appealing than for any other. Hence, though arguments against the proposal likewise are more compelling than against any of those that now function, it is a venture which every devotee of sound principle should watch with care. Whenever the Federal Government "gives" funds to the States on any score. it is well to violate the old rule and look the "gift horse" not only in the mouth but all over. If it is remembered always that these funds must first be collected from the people of the States, it will be easier to look upon the process with suspicion.

Announcement has been made that the spring meeting of the Textile Operating Executives of Georgia will be held in Atlanta, at the new Henry Grady Hotel on Peachtree Street, on Wednesday, March 18th. The meeting brings together the superintendents and overseers of the Georgia mills, with these executives from mills in neighboring states as guests.

The subjects of carding and spinning will be discussed by the men at this meeting, a questionnaire containing pertinent and current questions on these departments has been submitted to the Georgia men for their opinions. These questions will form the basis for the discussions on March 18th.

The meeting will be composed of two sessions: the morning will be devoted to carding, and the afternoon to spinning subjects. A "Dutch" luncheon served between the sessions will be livened up by musical and other entertainment.

William W. Arnold, Jr., of Manchester, Ga., is general chairman of the organization, and will preside at the convention. George A. Franklin, of Augusta, Ga., will conduct the morning discussion on carding, and Frank Dennis, of LaFayette, Ga., will be in charge of the afternoon consideration of spinning problems.

Cotton Cloth Calculations

BY ARTHUR H. DICK

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Cloth Counts.

The counts of a cotton cloth are designated by the sley, which is the number of warp ends to the inch, and by the pick, which is the number of picks of filling to the inch. Thus, a well known brand of sheeting is 84 sley and 80 picks, and when referring to this particular cloth, it is written 84 x 80, which means that there are 84 ends and 80 picks to the inch. It should be noted that the sley is always given first, followed by a multiplication sign and the pick.

The remaining particulars that are given when referring to a cloth are the width in inches, the warp counts, the filling counts, and the yards per pound. In the cloth referred to above the width is 36 inches, the warp counts are 30s cotton, the filling counts are 28s cotton, and there are 4.25 yards to the pound. When all these particulars are used collectively they are known as the organization of the cloth and are written: 84 x 80, 36 inch, 30s warp, 28s filling, 4.25 yards.

Warp Calculations.

Contraction or Take-Up During Weaving. When weaving, all cloths contract both in length and in width to a certain extent. In some cloths the contraction is greater than it is in other cloths, but no matter how great the contraction is it must be considered when making calculations for warp and filling. The contraction is due largely to the interlacing of the warp and filling during weaving. In addition to this, the sley, pick, weave, and the counts of the warp and the filling affect the amount of contraction in the cloth. No rule can be given for finding the amount, or per cent, of contraction that will apply to all cloths because of the different weaves and counts used. However, it is generally known that the greater the interlacings the greater the contraction. To illustrate this point the sketches in Fig. 1 are given, the large, black dots representing the picks, and the curved, horizontal line representing a warp end.

(a)

(b)

Fig. 1.

Referring to Fig. 1, (a) shows the interlacing of a warp end in a plain weave, while (b) shows the interlacing of a warp end in a twill weave. It is readily seen that the contraction of the yarn in (a) is greater than that of the yarn in (b).

Finding the Percentage of Contraction. The only method by which an accurate percentage of contraction, in either the length or width, of the cloth is found, is to take a piece of cloth of a known length and width and remove one warp end and one pick of filling. The next step is to measure the warp end and the pick of filling by laying them, separately, along a rule and removing the crimp. Care should be taken when doing this, as stretching either thread will give a too high percentage of contraction.

To find the percentage of warp contraction. Divide the length of the piece of cloth taken by the difference between the length of the warp end and the length of the piece of cloth. Then, divide this result into 100 and the quotient will be the percentage of warp contraction.

To find the percentage of filling contraction. Divide the width of the piece of cloth taken by the difference between the length of the pick of filling and the width of the cloth. Then, divide this result into 100 and the quotient will be the percentage of filling contraction.

Example. A warp end and a pick of filling are removed from a piece of cloth exactly ten inches square. If the warp end measures 11 inches and the pick of filling measures 11.5 inches, what are the percentages of warp and filling contraction?

$$\frac{10}{11 - 10} = 10$$

$$\frac{100}{10} = 10 \text{ per cent warp contraction}$$

$$\frac{10}{11.5 - 10} = 6.66$$

$$\frac{100}{6.66} = 15.01 \text{ per cent (15 per cent practically) filling contraction.}$$

Proof:

Warp—10 per cent of 10 inches = 1 inch.
10 inches + 1 inch = 11 inches.
Filling—15 per cent of 10 inches = 1.5 inches.
10 inches + 1.5 inch = 11.5 inches.

From these calculations, it is seen that the length of the warp is 10 per cent greater than the length of the cloth, and that each pick of filling is 15 per cent greater than the width of the cloth.

Finding the Number of Warp Ends in a Cloth. To find the number of warp ends in a cloth when the sley and width are known:

Multiply the sley by the width and to this result add the number of selvage ends.

Example. How many warp ends are there in a cloth of 84 sley, 36 inches wide, and containing 32 selvage ends?

$$84 \times 36 = 3{,}024 + 32 = 3{,}056 \text{ ends.}$$

To find the number of warp ends in a cloth when the number of ends in a pattern and the number of patterns in the warp are known:

Multiply the number of ends in a pattern by the number

of patterns in the warp and to this result add the number of selvage ends.

Example. A cotton gingham contains 30 warp patterns and each pattern contains 70 ends. How many warp ends are there in the cloth, if there are 12 selvage ends on each side?

$$70 \times 30 = 2{,}100 + 24 = 2{,}124 \text{ ends.}$$

Finding Lengths.

To find the length of warp required to weave a certain length of cloth when the percentage of warp contraction is known:

Multiply the length of the cloth by 100 per cent plus the percentage of warp contraction.

Example. What length of warp is required to weave a piece of cloth 150 yards long if the warp contraction is 12 per cent?

$150 \times 1.12 = 168$ yards, or the length of one warp end in the cloth.

To find the number of yards of warp yarn in a piece of cloth when the sley, width, length, and percentage of warp contraction are known:

First find the length of warp required to weave the cloth, then multiply this result by the sley times the width.

Example. A piece of cloth 100 yards long is 64 sley, 36 inches wide, and the warp contraction is 5 per cent. How many yards of warp yarn are there in the cloth?

$100 \times 1.05 = 105$ yards, length of warp required.

$105 \times 64 \times 36 = 241{,}920$ yards of warp yarn.

To find the length of each color of warp yarn in a piece of cloth when the length, percentage of warp contraction, warp pattern, and number of patterns in the warp are known:

Multiply the number of ends of each color in a pattern by the number of patterns in the warp times the length of warp required to weave the cloth.

Example. A piece of cloth of 500 yards contains 22 warp patterns, and the warp contraction is 6 per cent. If each warp pattern is arranged as below, how many yards of each color of warp yarn are there is the cloth?

Warp pattern:

Red			8		=	8 ends
White	11	22	22	22	11 =	88 ends
Tan			8		=	8 ends
Green				8	=	8 ends
Slate		8			=	8 ends

$500 \times 1.06 = 530$ yards, length of warp required.

Red $= 8 \times 22 \times 530 =$ 93,280 yards

White $= 88 \times 22 \times 530 =$ 1,026,080 yards

Tan $= 8 \times 22 \times 530 =$ 93,280 yards

Green $= 8 \times 22 \times 530 =$ 93,280 yards

Slate $= 8 \times 22 \times 530 =$ 93,280 yards

Finding Weights.

To find the weight of warp yarn in a piece of cloth when the counts, length of cloth, percentage of warp contraction, sley, and width are known:

Multiply the sley by the width and by the length of warp required to weave the cloth and divide by the counts times the standard.

Example. What is the weight of the warp yarn in a piece of cloth 250 yards long, warp contraction 7 per cent, 80 sley, 36 inches wide, and the counts 30s cotton?

$250 \times 1.05 = 267.5$ yards, length of warp.

$$\frac{80 \times 36 \times 267.5}{30 \times 840} = 30.571 \text{ pounds.}$$

To find the weight of each color of warp yarn in a piece of cloth when the length, percentage of warp contraction, warp pattern, number of patterns in the warp, and the counts are known:

Multiply the number of ends of each color in a pattern by the number of patterns in the warp and by the length of warp required to weave the cloth and divide by the counts times the standard.

Example. A piece of cloth 1,000 yards long contains 80 warp patterns, the warp contraction is 9 per cent, and the counts are 40s cotton. If each warp pattern is arranged as below, what is the weight of each color of yarn in the warp?

Warp pattern:

Pink	12	2	2	2	12 =	30 ends
White	10	10	10	10	=	40 ends
Green	2			2	=	4 ends

$1{,}000 \times 1.09 = 1{,}090$ yards, length of warp required.

$$\text{Pink} = \frac{30 \times 80 \times 1{,}090}{40 \times 840} = 77.857 \text{ pounds}$$

$$\text{White} = \frac{40 \times 80 \times 1{,}090}{40 \times 840} = 103.809 \text{ pounds}$$

$$\text{Green} = \frac{4 \times 80 \times 1{,}090}{40 \times 840} = 10.381 \text{ pounds}$$

Weight of Size in Warp Yarn.

In the preceding calculations, the weight of the size in the warp yarn has not been considered. However, in future calculations on warp yarns the weight of size will be taken into consideration, as this affects the weight of the warp yarn in the cloth.

The weight of the size will always be given as a certain percentage of the total weight of the warp yarn, and this weight will always be added to the weight of the warp yarn.

To find the weight of the warp yarn including the weight of the size when the total weight of the warp yarn and the percentage of size content is known:

Multiply the total weight of the warp yarn by 100 per cent plus the percentage of size content.

Example. A piece of cloth is 100 yards long, warp contraction 5 per cent, 64 sley, 36 inches wide, counts 30s cotton, and the size content is 6 per cent. What is the weight of the warp yarn including the weight of the size?

$100 \times 1.05 = 105$ yards, length of warp.

$$\frac{64 \times 36 \times 105}{30 \times 840} = 9.6 \text{ pounds, weight of warp yarn.}$$

$9.6 \times 1.06 = 10.176$ pounds, weight of warp yarn including weight of size.

Filling Calculations.

Finding the Width at the Reed. It has been stated previously that the length of each pick of filling is longer than the width of the cloth, the exact length depending upon the amount of contraction in the width of the cloth. The length of each pick of filling is the same as the width that the warp of that cloth occupies in the reed.

To find the width at the reed, or the length of each pick

of filling, when the width of the cloth and the percentage of filling contraction are known:

Multiply the width of the cloth by 100 per cent plus the filling contraction.

Example. A certain cloth is 32 inches wide and the filling contraction is 8 per cent. What is the width at the reed, or the length of each pick of filling?

$$32 \times 1.08 = 34.56 \text{ inches.}$$

Another method of finding the width at the reed is used when the reed number and the number of dents occupied are known. The reed number is the same as the number of dents to the inch in the reed. That is, a number 50 reed signifies that there are 50 dents to the inch in that particular reed.

To find the width at the reed when the reed number and the number of dents occupied are known:

Divide the number of dents occupied by the reed number.

Example. A cloth contains 2,000 ends reeded 2 per dent and 48 selvage ends reeded 4 per dent. What is the width at the reed if a number 30 reed is used?

2,000 ends reeded 2 per dent = 1,000 dents
48 ends reeded 4 per dent = 12 dents

Number of dents occupied = 1,012
1,012 ÷ 30 = 33.733 inches.

Finding Lengths.

To find the number of yards of filling yarn in a piece of cloth when the length, width, filling contraction, and pick are known:

First find the width at the reed, then multiply this result by the pick times the length of the cloth in yards.

Example. A piece of cloth 200 yards long, 36 inches wide, filling contraction 10 per cent, contains 60 picks to the inch. How many yards of filling yarn are there in the cloth?

$36 \times 1.10 = 39.6$ inches.
$39.6 \times 60 \times 200 = 475{,}200$ yards.

To find the number of yards of each color of filling yarn in a cloth when the length, width, filling contraction, filling pattern, and pick are known:

First find the total number of yards of filling yarn in the cloth, then multiply this result by the number of picks of each color in a pattern and divide by the total number of picks in a pattern.

Example. A piece of cloth 100 yards long, 30 inches wide, filling contraction 10 per cent, contains 80 picks to the inch. If each filling pattern is arranged as below, how many yards of each color of filling yarn are there in the cloth?

Filling pattern:

Red	8				= 8 picks
White	22	22	22	22	= 88 picks
Slate		8			= 8 picks
Green			8		= 8 picks
Tan				8	= 8 picks

120 picks in a pattern

$30 \times 1.10 = 33$ inches, width at reed.
$33 \times 80 \times 100 = 264{,}000$ yards of filling yarn in the cloth.

$$\text{Red} = \frac{264{,}000 \times 8}{120} = 17{,}600 \text{ yards}$$

$$\text{White} = \frac{264{,}000 \times 88}{120} = 193{,}600 \text{ yards}$$

$$\text{Slate} = \frac{264{,}000 \times 8}{120} = 17{,}600 \text{ yards}$$

$$\text{Green} = \frac{264{,}000 \times 8}{120} = 17{,}600 \text{ yards}$$

$$\text{Tan} = \frac{264{,}000 \times 8}{120} = 17{,}600 \text{ yards}$$

Finding Weights.

To find the weight of the filling yarn in a cloth when the length, width, filling contraction, pick, and counts are known:

Multiply the width at the reed by the pick times the length of the cloth in yards and divide by the counts times the standard.

Example. A piece of cloth 300 yards long, 32 inches wide, filling contraction 8 per cent, contains 58 picks per inch of 35s cotton yarn. What is the weight of the filling yarn in the cloth?

$32 \times 1.08 = 34.56$ inches, width at reed.

$$\frac{34.56 \times 58 \times 300}{35 \times 840} = 20.453 \text{ pounds.}$$

To find the weight of each color of filling yarn in a cloth when the length, width, filling contraction, filling pattern, pick, and counts are known:

First find the total number of yards of filling yarn in the cloth, then multiply this result by the number of picks of each color in a pattern and divide by the total number of picks in a pattern times the counts times the standard.

Example. A piece of cloth 200 yards long, 32 inches wide, filling contraction 8 per cent, contains 57 picks per inch of 28s cotton yarn. If each filling pattern is arranged as shown herewith, what is the weight of each color of filling yarn in the cloth?

Filling pattern:

Pink	16				= 16 picks
White		8	8	8	8 = 32 picks
Black		4		4	= 8 picks
Blue			4		= 4 picks

Picks in a pattern = 60

$32 \times 1.08 = 34.56$ inches, width at reed.
$34.56 \times 57 \times 200 = 393{,}984$ yards of filling in the cloth.

$$\text{Pink} = \frac{393{,}984 \times 16}{60 \times 28 \times 840} = 4.467 \text{ pounds}$$

$$\text{White} = \frac{393{,}984 \times 32}{60 \times 28 \times 840} = 8.934 \text{ pounds}$$

$$\text{Black} = \frac{393{,}984 \times 8}{60 \times 28 \times 840} = 2.233 \text{ pounds}$$

$$\text{Blue} = \frac{393{,}984 \times 4}{60 \times 28 \times 840} = 1.116 \text{ pounds}$$

Reed Calculations.

A rule for finding the width at the reed has been given,

but this is not by any means the only calculation necessary concerning the reed.

Reeds are usually marked either by the number of dents to the inch or by the number of dents in the total width of the reed. Thus, a reed marked 30 and a reed marked 975 — 32½ (975 dents on 32½ inches) will both produce the same sley cloth, all other particulars being the same.

To find the reed number to use to produce a given sley of cloth:

Divide the total number of dents occupied in the reed by the width at the reed.

Example. A cloth is 36.5 inches wide including selvages, 84 sley, filling contraction 7 per cent, and reeded 2 per dent throughout the cloth. What is the reed number?

36.5 × 1.07 = 39.055 inches, width at reed.
84 × 36.5 = 3,066 ends in the warp.
3,066 ends reeded 2 per dent = 1 533 dents.
1,533 ÷ 39.055 = 39.252 reed number.

(N. B.—In this case a number 39 reed would be used.)

Warp and Filling Calculations.

Finding the Average Counts. To find the average counts of yarn in a cloth when the sley, pick, counts of warp, and counts of filling are known:

Divide the sley by the warp counts and the pick by the filling counts, then divide the sum of the sley and pick by the sum of the results obtained in the first calculation.

Example. If a cloth is 76 x 84, the warp 30s and the filling 34s, what are the average counts?

76 ÷ 30 = 2.533
84 ÷ 34 = 2.470

160 ÷ 5.003 = 31.981s average counts.

Finding Counts of Warp or Filling to Retain Weight of Cloth. Oftentimes it is necessary to produce a cloth of a certain weight using the warp counts that the mill is spinning. In this case it is necessary to find the counts of filling required to retain the weight of the cloth.

To find the counts of filling required to retain the weight of the cloth when the sley, pick, counts of warp and filling in the cloth, and the counts of warp on hand are known:

First divide the sley by the warp counts and the pick by the filling counts and add the results. Next divide the sley by the counts of warp on hand and subtract this result from the result obtained in the first calculation. Then divide the pick by the result last obtained.

Example. A cloth is 84 x 80, 48s warp, and 54s filling. If the counts of warp on hand are 50s, what are the counts of filling required to retain the weight of the cloth?

84 ÷ 48 = 1.750
80 ÷ 54 = 1.481

3.231

84 ÷ 50 = 1.68
3.231 — 1.68 = 1.551
80 ÷ 1.551 = 51.579s, counts of filling required.

Again, it is sometimes necessary to reproduce a cloth of a certain weight using the counts of filling on hand, instead of the counts of filling in the cloth. In this case it is necessary to find the counts of warp required to retain the weight of the cloth.

To find the counts of warp required to retain the weight of the cloth when the sley, pick, counts of warp and filling in the cloth, and the counts of filling on hand are known:

First, divide the sley by the warp counts and the pick by the filling counts and add the results. Next divide the pick by the counts of filling on hand and subtract this result from the result obtained in the first calculation. Then divide the sley by the result last obtained.

Example. A cloth is 64 x 64, 22s warp, and 28s filling, If the counts of filling on hand are 26s, what are the counts of warp required to retain the weight of the cloth?

64 ÷ 22 = 2.909
64 ÷ 28 = 2.285

5.194

64 ÷ 26 = 2.461
5.194 — 2.461 = 2.733
64 ÷ 2.733 = 23.417s, counts of warp required.

Finding Yards Per Pound.

To find the number of yards per pound, first find the weight of the warp and the weight of the filling in the cloth, then divide the length of the cloth by the sum of the weights.

Example. A piece of cloth is 100 yards, the weight of the warp is 12.49 pounds, and the weight of the filling is 11.01 pounds. What are the yards per pound?

12.49 pounds
11.01 pounds

23.50 pounds
100 ÷ 23.5 = 4.255 yards per pound.

Finding Certain Particulars of a Cotton Cloth.

It is the purpose of this last section to illustrate the calculations involved when finding certain particulars of a cotton cloth. No new rules or calculations are introduced, it simply being an example of how the required particulars are calculated.

Cotton Sheeting.

Data: Sley = 76, Pick = 84. Width within selvages = 35.5 inches. Warp = 30s. Filling = 34s. Warp contraction = 8 per cent. Filling contraction = 12 per cent. Size content = 6 per cent. Add to width, for selvages: .5 inch = 48 ends. Remarks: Body of cloth reeded 2 per dent. Selvages reeded 4 per dent.

If an order calls for 100,000 yards of cloth of the above construction, what are the answers to the following requirements?

1. Total number of ends in warp.
   76 × 35.5 = 2,698 plus 48 = 2,746 ends.
2. Width at reed, including selvages.
   36 × 1.12 = 40.32 inches.
3. Reed number.
   2,698 ends reeded 2 per dent occupy 1,349 dents
   48 ends reeded 4 per dent occupy 12 dents

   Total number of dents occupied = 1,361
   1,361 ÷ 40.32 = 33.754, or a No. 34 reed.
4. Weight of warp, including size.

100,000 × 1.08 = 108,000 yards, length of each warp end.

$$\frac{2{,}746 \times 108{,}000}{30 \times 840} = 11{,}768.571 \text{ pounds.}$$

11,768.571 × 1.06 = 12,474.685 pounds.

5. Weight of filling.

$$\frac{84 \times 40.32 \times 100{,}000}{34 \times 840} = 11{,}858.823 \text{ pounds.}$$

6. Yards per pound.

Weight of warp = 12,474.685 pounds
Weight of filling = 11,858.823 pounds

Total = 24,333.508 pounds

100,000 ÷ 24,333.508 = 4.109 yards per pound.

The above weights give the actual weight of the warp and filling in the cloth. However, in actual practice a certain percentage would have to be added to these weights to provide for the waste, this percentage depending upon the conditions in the mill where the yarn is spun and the cloth woven.

The Fallacy of Oil as Industrial Fuel

BY WILLIAM SIBLEY.

Back in 1910, a great many people scoffed the prediction, then current, that we had reached our peak in anthracite production. It was pointed out, with some reason, that no one could accurately determine or estimate the subterranean reserves of coal. Subsequent production, however, has proven the truth of the prophecies made fifteen years ago, the facts being that our 90 million ton production in 1910 has never been greatly increased, not even under the strain of the war period. We will probably never produce 100 million tons of anthracite in any one year and in all probability our present production will decrease as ensuing years fold away.

All of which is injected at the start of this article only to show that production estimates do possess a degree of accuracy; that we should accord an open mind to the prophecies now current that our fuel oil production has reached its peak and that our oil reserves will be largely exhausted within the next fifteen years.

About three or four years ago, the United States Geological Survey and the American Association of Petroleum Geologists appointed a committee to estimate the extent of producing oil fields in the United States, both "possible" and "probable." The findings of this committee reported an estimate of approximately nine billion barrels (9,150.000,000 to be exact).

In 1908 our crude oil production was 178,527,355 barrels (of 42 gallons each). In 1922 this production had increased to 551,197,000 barrels of crude oil, while in the following year, 1923, we produced 721,750,000 barrels. 1924 production is estimated at something in excess of 625,000.000 barrels. Taking the 1922 rate of production, our estimated reserve of nine billion barrels will last about sixteen years. Under the 1923 rate, our reserves will prove sufficient for only 13 years.

The firm of Skinner, Sherman & Esselen, (Chemists and Engineers of Boston) recently made an exhaustive research into the fuel oil supply of the United States and the world. This report was compiled for the Associated Industries of Massachusetts. The report is most intelligently compiled and presented and their conclusions are extremely interesting. They are:

"1—The United States is producing now at a rate which would entirely exhaust the estimated oil reserves of this country in about thirteen years.

"2—Our ability to depend upon foreign production is extremely dubious and even if we could get half the estimated reserves of the world we should exhaust this amount in not over 30 years, at the present rate of consumption.

"3—The proportion of fuel oil which is now being obtained from petroleum will probably be gradually decreased by a progressive increase in the percentage of the crude material which will be made available for motor fuel.

"4—Economical production of oil from shale is not an immediate probability."

Writing under the caption of "The Fuel Problem" in the Atlantic Monthly, Arthur D. Little says:

"More than 90 per cent of all the automobiles in the world are in the United States. We consume today about 120,000,000 barrels of gasoline and 7,200,000 barrels of motor oil a year, and are called upon to contemplate a requirement of 250,000,000 barrels of gasoline, by the automotive industry alone, within fifteen years. There is small justification for the hope that we can get it. There is no general substitute in sight that promises to be available in adequate amount, although both alcohol and benzol function admirably as motor fuel.

"The Geological Survey estimates that the oil reserves of the country are more than 40 per cent exhausted. The 60 per cent represents what is left in spite of our utmost endeavors to get it out. It totals something like six and one-half billion barrels, on which we may hope to draw—at our present rate of consumption. This leaves a short time in which to develop a substitute for 250,000,000 barrels of gasoline, even if the possibility and means of such development were in sight.

"Requa foresees a demand for 900,000,000 barrels of petroleum by 1930; and it is not surprising that he regards it as a quantity which the oil territory of the United States is probably incapable of supplying.

"With our domestic yield representing two-thirds of the entire petroleum output, and with a consumption within the United States of one-half of all the petroleum values produced, it is not surprising that nations, corporations, and individuals are engaged in a desperate search for petroleum, which extends to the remotest corners of the earth. It is, indeed, the Day of Petroleum, but no one knows the time o' day."

With any possible decrease in crude oil production there will come a corresponding increase in price. The truth of this has already been demonstrated through the difference between the 1924 production and the peak year of 1923. One year ago the Shipping Board (on the Pacific Coast) paid 90 cents a barrel for oil. Only recently they opened their bids for the ensuing year and found the lowest price to be $1.29 a barrel. Pacific Coast oil priced at $1.29 a barrel means a price of $1.90 or $2.00 for the Atlantic Seaboard (on large contracts) and a still higher price for small quantities.

Right here I wish to dispel any possible impression that I am taking issue with any statements that have been made

in defense of oil as fuel. It is not my desire to give rise to acrimonious discussion regarding the merits of different fuels. I feel, however, that the textile mill owner or the power plant engineer should carefully consider the figures set forth and weigh in the balance of good judgment the available facts.

Coal Still the Basic Fuel.

Within the span of one lifetime—within the memory of at least two men—our coal production has increased itself approximately 12,500 times. When Dr. William Elliott or Chauncey M. De Pew were little tads, just starting to school, our coal production was about 50,000 tons. Today we are nearing 600,000,000 tons as our annual production. This tremendous increase, however, indicates no possibility of a shortage of coal within the coming period of equal length—85 or 90 years. Considering all the increased demand for power due to industrial development that it is possible to calculate, and striking from that calculation an estimated coal requirement of one billion tons a year, our known coal reserves would withstand exhaustion for many generations to come.

The available coal supply can perhaps be best visualized by saying if all our known coal reserves were extracted from the earth and gathered into one pile, that stock of coal would form a cube eight miles high, eight miles wide and eight miles long. All the coal we have thus far used amounts to a slice from this enormous cube about 3.000 feet thick. From this we can readily appreciate the inexhaustibility of our coal supply. As for the tonnage of coal produced as against the production of oil it can be said: if all the oil produced in the world today were consumed for fuel purposes, the b.t.u. generated therefrom would not equal 20 per cent of that now generated by coal.

Knowing that coal is to remain our principal source of heat and power, our thoughts turn naturally to consideration of waste elimination. In the past, the waste concomitant with burning coal raw has been enormous. Our steam locomotives, for instance, use in excess of 100 million tons of coal annually, which consumption represents a waste of over 50,000,000 tons—a waste that is blown out of the stack in the form of cinders, smoke, gas, etc. Coal waste in industry has been estimated at 43 per cent. And the ones making the investigation offered in their report the conclusion that this 43 per cent waste could be reduced to 30 per cent, merely through the employment of good engineering skill and more efficient equipment.

As industry consumes 24 per cent of coal production, a reduction of 13 per cent in our industrial fuel waste would mean a saving of approximately 20,000,000 tons of coal annually. It is my belief that the estimated possible decrease in waste is ultraconservative. It certainly is for these industrial plants classed as small (generating upwards of 350 h.p.) for in the average power plant of that type—running the small capacity textile mill, it is my belief that a 25 per cent decrease in waste fuel could be easily effected through the installation of better and more efficient plant equipment alone.

During the past thirty years we have witnessed criminal waste in the consumption of coal. We stand today, however, on the threshold of an era in which we will practice greater economy; derive greater benefits from the coal we consume. We are entering a period of reckoning, so to speak, for our past prodigality. In the coming years we will hear the command of the chemist, the voice of the combustion engineer. If not of our own seeking, we hear them, then certainly of necessity. We cannot continue our prodigal waste of coal productivity.

Already there are indications that this period of economy is here. Betterment in industrial fuel combustion practices during the past ten years has cut 75 million tons from our annual coal consumption. By that I mean that had the improvements of the past decade, in boiler plant practice never come about, we would today be consuming 75 million tons of coal in excess of our present consumption. Roughly, that is the benefit we have already derived from increased attention to combustion practice.

But there remains a long road ahead. We have not arrived. And to travel this road of waste elimination successfully the earnest effort of both manufacturer and operator is necessary. More efficient boiler plant equipment is being developed continually. This development will continue—and the acceptance and adoption of such equipment must keep pace with the development. For instance, within the past year, there has been developed (and proven) a new stoker for use in small units that will burn screenings, high in volatile, with absolute smokelessness, and with an efficiency ranging from 78 to 88 per cent. Each succeeding year brings more advanced steps in power plant practice, and only through the adoption of these methods can we hope to attain our possible 13 per cent waste reduction.

There is little doubt regarding the temporary character of fuel oil. There can be no doubt regarding the permanence of coal. It remains for the engineer to discard wasteful and obsolete equipment and methods in favor of more modern, more efficient, means.

James McDowell, of Boston, technical expert in textile manufacturing for the Sharp and Hamilton Mills of New England, and the Brighton Mills, of New Jersey, has been engaged to direct the research work in the textile school of the North Carolina State College, Raleigh, N. C.

Mr. McDowell is a native of Scotland, and for several years was fiber expert in the firm of J. & P. Coats. He has been in America about fifteen years, during which time he has become recognized as one of the leading textile fiber experts in the country. This engagement at the North Carolina college is the first step taken in the enlargement of the textile school, and in the creation of a great research department for the benefit of the textile industry of the state. It is the purpose of the board of trustees under the direction of Mr. McDowell, to develop the research work along the following lines: 1. A study of the cotton fiber from various sections of the cotton growing areas of North Carolina and elsewhere, with special emphasis on their affinity for bleaching, dyeing and mercerization. 2. Testing yarns and cloth from different cotton and staple fabrics to determine shrinkage, breaking strength standards, etc. 3. Testing of starches used in sizing and testing dyes and their properties. 4. Studying the problem of waste, due to selection of imperfect fiber and improper use of machinery. 5. Testing the uses of the cotton fiber for mechanical as well as domestic uses and extending the research into market demands. 6. Studying designs and methods of finishing goods and the economic advantage to be derived from manufacturing fabrics of higher standards. 7. Studying the cotton mills of North Carolina, their mechanical equipment, and what gradual changes may be effected in order to meet the market demands of the future.

Scientific Trends With a Textile Slant

System and Management.

We have passed through an era of record-keeping and clerical system in mill management, the ultimate of which has been some plants in which you can hardly get a drink of water without entering the fact in a properly designated place on a card.

Much of the lost motion of even beneficial systems is due to the very cumbersomeness of this vast amount of detail which is being kept and the necessity, to which you are committed, of keeping up with it.

"Look for men of moral uprightness, physical vigor and a given level of intelligence."

With this specification for executives does Erwin Haskell Schell lay the foundation for the uprooting of the incompetence, tyranny and camouflage in management which so frequently plague industrial relations.

Every manager can profit by reading his book, "The Technique of Executive Control." Schell is a practical man, an engineer, a worker in every sense of the word and knows his ground. He has made a success of his work in the midst of a reactionary industrial region.

We might add that in addition to being an engineer it helps an executive to be a regular fellow. The author of the above book is all of this—hence the additional weight of every line of what he has written.

Following this experience, a method of handling the problem of records, costs, production performance, etc., occurs to us which is not as unique as it sounds, some features of it having been worked out already very successfully.

This is to devise a *practical* ideal standard in these various matters and to bend *all* the energies of the plant staff to its maintenance—the effort hitherto spent upon *accumulation* and *distribution* of data, taken from actual work accomplished, being thus directed solely upon the work itself. It would require fewer "observers"—and they would have to be good. It would be a great test for both theorists and practical mill men. But the chief value of it has been found to be the unlooked for possibilities it has brought out in the way of ability to perform hitherto undreamed of tasks.

Wood Economy.

Statistics of the wood conservationists would make a pessimist of everyone who loves the forest. More practically, what are we going to turn to when the supply of suitable wood for our various needs can no longer be had?

A cotton mill has thousands of extremely special uses of wood—uses which it is said will bear no substitution. Already, however, fiber ends replace wooden ones on bobbins, cardboard goes into cones—and possibly tomorrow will see a completely woodless loom for every class of weaving.

The kind of invention which will bring about this change should originate within the mill staff rather than the machine manufacturing company. These men know the problem in all its intricacies. Moreover, we think the time is ripe, now, for a sort of liasion staff, to function between the mill (or the manufacturing association) and the machine manufacturer. It will help both and be particularly a cost-saving service to the mill.

Light.

An ordinary cheap window cuts out about 30 per cent of the daylight before admitting the balance to light an interior. Poorly designed panes still further reduce the efficiency and a solid wall cuts it all out, so it is fair to measure *glass itself* in terms of kilowatts saved during daylight hours.

Glass is sold in many grades and thicknesses; and in many degrees of light-transmitting efficiency. If a purchasing agent or construction specification engineer pays attention to checking up on this feature he can be the means of saving a plant a very considerable item in future maintenance costs. The procedure of making the necessary tests is simple enough; perhaps the importance of it has been too often overlooked. We know of judgments awarded for light cut off by passing traffic—but the inferior window pane itself stayed there between the light and the work all the time.

Advertising.

The most dogmatic advertising man admits that a well-designed article (or container for the same) possesses inherent advertising qualities difficult to surpass even with a national campaign.

The fact that some extremely successful pieces of selling never had a publicity campaign to put them into general and firmly-established market status would seem to indicate the basic truth of the idea that advertising effort should begin with the appearance and quality of the merchandise itself.

Every trunk maker who delivers his product in quantity lots, wrapped, is throwing away good dollars which he must match in more expensive mediums in order to bring public attention to what he has to offer.

Automobile manufacturers know this and take advantage of it, other manufacturers also, but textiles are asleep.

Printed labels on packing cases, case-size stickers (in poster form) and the very bolts of cloth themselves can be "copy" at a much lower rate than a double-page spread in a national magazine. A great deal of advertising expenditure is most uneconomically expended; while we are at it why can't one of the conditions of placing car shipments with either of two competing railroads from the factory be made conditional upon carrying poster-display of the trade symbol on these cars?

Piece Goods.

It is nearly impossible to write this paragraph without emphasizing the critical viewpoint, although that is not the important feature of it.

We referred, above, to the advertising strength of a well-designed article or its container. We should like to draw attention, moreover, to the importance, to the sales asset of the *size* of an article. Specifically, the problem of living and the necessity for home economy has brought about a greatly increased tendency to home cutting up of fabrics. We have referred to this earlier, and now figures are available which substantiate the partial dependence of style upon necessity and the increasing tendency of public demand for wider fabrics.

Silk has widened from 20 inches to 39 and 40 inches in fifteen years, and there is a strong demand for 54. How can cotton piece goods compete, in the face of this size ad-

vantage, unless they get into a closer approximation with the current trend?

Nor is mere width the whole problem. Adjustments in width should be balanced by concurrent design and *some readjustments, to suitability,* of the weave-pattern itself.

What problem this will present to the owner of a large investment in narrow looms is another story, one which it may be distinctly up to the ingenuity of the loom manufacturer to help him solve, perhaps through redesign of *type* to a broader range of fabric adaptability.

The Profession of Textile Machinery Building.

Some work we have just done for the manufacturer of a high quality machinery product emphasizes the need for and the twofold value of proper coordination of the years of development work passed through by all such companies into (1), greater service to the user of the machine; (2), the manufacturer's ability to more definitely concentrate his effort upon selling the real tried features which his experience has produced; and (3), resultant advancement to the science and art of textile manufacturing.

Some of the more valuable economical and operating factors are totally neglected in the catalog and advertising of our old line, solid, machine companies, and are passed over for so-called "competitive features." The Lord help our industry when sound engineering design, sterling workmanship, honest materials and ingenuity are not the recognized standards of competition in either machine or product therefrom.

There is more romance in this ensemble of the product from a fine old shop than in many novels. Let the manufacturer leaven this with the proper emphasis of discriminative advertising and merchandising and he will shortly be on the upper half of the ladder.

Unpopular Cotton.

It is too bad that this industry, which ought to be the most vital one in the lives of all the American people, should be handicapped by the shallow conclusions and unsound counsel of uninformed advisers. In point, to base the hope of developing domestic markets on propaganda to socially popularize cotton goods, and to stimulate their usage by an appeal to subvert natural instincts of taste and utility to commonplaceness is wasteful, idle and dangerous talk.

Cotton will replace silk, in popular demand, in certain fields, when and if its adaptability features warrant it. A tremendous price differential will not force this which an even moderate application of genius will achieve.

More than price differential has brought flax as a competitor into the tire cord and industrial bag markets. More than lightness in weight and soft sheen has transferred certain factors of cotton consumption to the silk manufacturer.

Cotton is not receiving its share of *type* and *refinement* development; it can be manufactured in sturdy construction, in fine, soft, pleasing ones, and in other types even *more* specifically adapted to lines of make-up than other textiles which now *apparently* dominate these fields.

We've been taking bad advice from people who seem to think that money and its manipulation can do anything with an industry at the pull of a string. We ought to get back on to the solid ground of realizing that only in the inherent developments within an industry itself lies its retrogression or gain. Some of these remedists discuss cotton as though it were a pawnbroker's stock in trade. The very factor they do not even deign to discuss—design—could pull them out of all their dollar difficulties if they could only analyze the demand deeply enough to realize it and to initiate it.

American Cotton Manufacturers to Meet.

The 29th annual convention of the American Cotton Manufacturers' Association will be held at the Roosevelt Hotel, in New Orleans, Louisiana, on Friday and Saturday, April 10th and 11th. In connection with this meeting a great cotton conference is in prospect, according to Secretary Winston D. Adams, for invitations will be extended to all factors engaged in the cotton trade. especially the growers, ginners, warehousemen, shippers, merchants and distributors generally, including the cooperatives, the bankers and the exchanges.

It is felt that the present is an opportune time for such a great "get-together" meeting, and that New Orleans is an ideal place for such a conference. Already acceptances have been received from many of the larger agencies, and there is every assurance that a most eventful and interesting convention is in prospect.

The New Orleans Cotton Exchange, the New Orleans Board of Trade, and other factors are bending every energy to make this convention one of the most largely attended and most successful ever held in the South.

Particular emphasis will be given at this convention to the primary problems of production and distribution, the program including speakers of national note, who will be expected to offer practical suggestions in line with the advanced thought of the trade, looking to a better grade and staple for the South's major crop. Open discussions will be carried on.

The belief is firmly held that there is not and never has been enough of contact between the growers, who raise the cotton, and the manufacturers, who spin and weave it, and any agency for a more sympathetic and a closer understanding between them should result in inestimable good.

The sessions on Friday, April 10th, will be devoted to a consideration of general problems touching the cotton trade, with a great cotton banquet in the evening. The single session on Saturday morning, April 11th, will be confined to manufacturers, at which time reports will be received from the various committees of the Association and the election of officers will follow.

An unusually large attendance from the North and East is expected. The National Association of Cotton Manufacturers will convene in Washington, D. C., on April 6th, 7th and 8th, and arrangements have been perfected for the operation of special Pullmans from Washington, leaving the Capitol City on Wednesday evening, April 8th, and arriving in New Orleans in ample time for the opening session on Friday. It is anticipated that a large delegation of the New England manufacturers will attend the New Orleans meeting.

Overflow accommodations have been reserved at the St. Charles Hotel and at The Bienville and mmebers and guests should make their reservations direct from this allotment.

Officers of the American Cotton Manufacturers Association are: President, A. W. McLellan, New Orleans; first vice-president, W. J. Vereen, Moultrie, Ga.; second vice-president, S. F. Patterson, Roanoke Rapids, N. C., and secretary-treasurer, Winston D. Adams, Charlotte, N. C.

What Other Men Manage With

BY R. A. SONIAMAN.

The Spinning Frame.

Spinning is the last operation in the actual making of a yarn. True, the product often goes through many processes after it is spun, and the possibilities of its being spoiled in these after operations are legion; but the actual fabrication is consummated at the spinning frame. All the various factors which go to make for strength, evenness, elasticity, smoothness, have done their best—or worst.

It is, therefore, immensely important that the spinning operation—the culmination of yarn making processes—be carried on in the most efficient manner. Twentieth century progress makes it imperative that a textile establishment shall be in possession of every possible scrap of knowledge pertaining to the best manipulation of its spinning machinery.

Therefore, the visitor, who has been through all the previous departments will be very anxious to see how the work is handled at this important process, and will like to note the make and condition of the machinery; for it is interesting to see what make or makes of frames the other fellow has, and to hear him fervently praise, or as lugubriously depreeate the one or the other. One spinning room that the writer visited looked as though it were an experimental station for American and English spinning frame makers, because it seemed that they were all represented by a few machines.

"How do you manage for renewals?" the superintendent was asked.

"Give me frames of all one make, I don't care which," he vehemently retorted by way of reply. The experienced reader will, no doubt, sympathize with this poor fellow.

Ask your fellow executive, when visiting his shop, what he thinks about the gauge of his frames. Is he a narrow-gauge, anti-ballooner, or does he openly espouse a wider gauge and none of those necessary evils indispensable to a narrow gauge—separators. The writer believes that the trend at present is toward a wider gauge, and that the wide gauge frame will be a certainty in the future. Some of the advantages of the wider gauge frame may be cited as:

1 larger production per spindle.
2 greater spindle speed attainable
3 less whipping, and consequently
4 less doubles
5 quality a bit better, on the average.

Are the machines driven individually by motor, in groups of 2 or 4, or by the old-time clustered overhead drive? Are the frames placed lengthwise across the width of the room, so that 2 rows of shafting will drive them all by means of quarter-turn belts? What is the opinion of your friend in regard to the cost and efficiency of his particular driving problem?

What about the cylinders? Are they single, *A*, or double, *B*, in Fig. 1? What is the opinion of two cylinder frames? Is there a more uniform band drive? Has advantage been taken of the narrow widths of two cylinder machines to install more frames in a given space than is possible with the wider-width single-cylinder machine? Is there any increase in the cost for banders with the double cylinder than for the single-cylinder frames?

What is the inclination of the rolls? Is it sufficient to insure as good running as is consistent with the type of cotton used? Is the distance between the second and third line fixed? Is this considered an advantage or otherwise?

By the way, has your friend ever noticed just what shape the bearings for bottom rolls are? One English firm has a bearing which is designed to reduce friction. Fig. 2 shows this style of bearing. It will be readily seen that there are really only two points at which the roller comes in frictional contact with the bearing, and these points are indicated by the arrows.

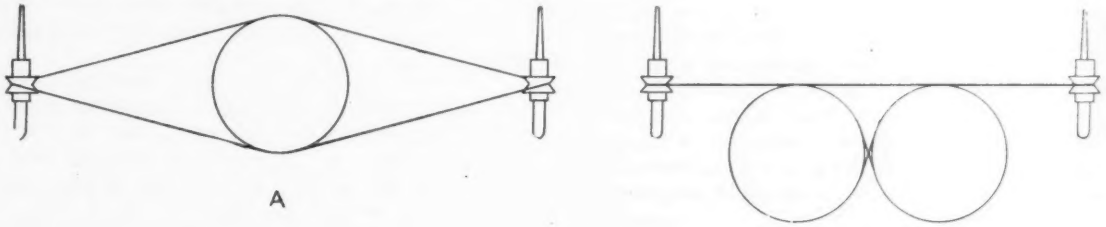

FIG. 1

Are the capbars cut at an angle to prevent fly waste from gathering and consequently retarding the free movement of the top rolls?

What is the attitude toward self-weighted top rolls? The writer finds that this system is becoming more and more popular as it permits a closer setting of the rolls. What is the practice in regard to the covering of the back top roll in the self-weighted system? "I'm very much in favor of leaving the back top rolls bare," remarked one manager, "because there is quite a saving, first, in the matter of the covering itself, and, secondly, by the elimination of the bad work due to faulty covering."

Are middle top rolls of wood or steel? For a fine yarn mill a wooden core is usually sufficiently heavy; but a coarse mill would do well to use a steel core. This seems to be the consensus of opinion among men who have had experience on this type of weighting of top rolls.

One enthusiastic "fan" of this system remarked, "Setting of the rolls is not quite so fussy an operation with the self-weighted top rolls as it is with the saddle weighted rolls. And another thing—with self-weighted top rolls I set the rolls well under the staple. In fact, I set them as close as I can without cockling. I find the work runs better."

In connection with roll setting, ask if your fellow manager has ever experimented with setting the top rolls a little farther apart than the bottom rolls.

What is the distance (D) between the thread guide and

the top of the bobbin? Fig. 3. It is surprising to find that some spinners have never given this point much thought, and yet it is a matter which has a big bearing on the good or bad running of the frames.

What is the length of the bobbin-traverse? Six inches seems to be a fair average for fine and medium counts. Does the ring-rail travel up fast and down slow, or vice versa? And just what effect has it on the running of the

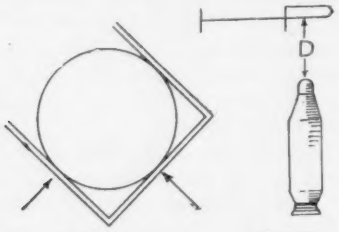

FIG. 2 FIG. 3

frames? And why was that special method adopted? Did the particular needs of the next process have any bearing on the matter?

Spindles also should come into the discussion. What type does your friend like best? "Spindles are spindles," but "there's a difference," as one wiseacre of a spinner remarked.

Top clearers form an interesting topic of discussion, particularly since, with the system of self-weighting top rolls, the roller clearer *C*, Fig. 4, is being more or less tentatively experimented with. What about keeping the clearers clean? One firm making a nationally known product has a system of using young girls to pick the clearers, going to this expense in order to make their product what it is—almost faultless.

To a man who has had any practical experience around a spinning frame, who is still keenly interested in the making of as perfect a bobbin, embodying the utmost in yardage, as in his section-hand days, the pick motion will always have a deep fascination. Although its function is always

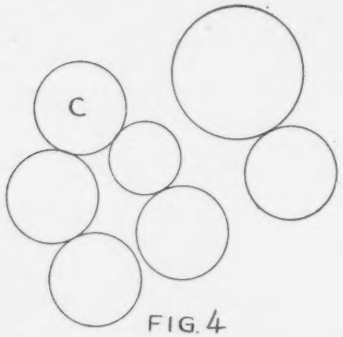

FIG. 4

the same, yet the variations in the make-up, and the varying degrees of efficiency attained, form a subject that never seems to tire.

Since the day the first spinning frame was successfully operated, inventors have labored to fit to it some contrivance that will eliminate lap waste. Most certainly, this is a laudable ambition; but the very limited space in which to put such a device, together with the multiple duplications necessary to equip each end, added to the fact that cost of operation must not be increased on account of a worker not being able to attend as many spindles with the device as without it, have been, hitherto, almost insurmountable obstacles. It is, therefore, illuminating to see what is being done in this line by other mills, either by encouraging ideas from their own workers, or from without the plant.

Wood or metal creels? And the advantages and disadvantages of each? What are the threadboards, wood or metal?

How are the spindles driven, by tape or band? What are the ideas in regard to these two methods of spindle driving? "Any man who has ever had any experience with these two drives, will always prefer the tape," responded one man. "The reason? Very simple. Let me give you a comparative list of the advantages and disadvantages of the two:

	BAND ADVANTAGES	TAPE ADVANTAGES
1	.....	Uniform driving
2	.....	Less stoppages
3	.....	Bigger production
	DISADVANTAGES	DISADVANTAGES
1	Uneven driving	.....
2	Larger number of spindles stop.	.....
3	Less production	.....

So you see the advantages are all on the side of the tape." Any one wishing to check these statements will find himself well paid for the time and trouble devoted to digging out the facts.

If bands are used, what is the type: twisted or braided? And its composition? Since the driving of the spindles is one of the most vital factors connected with the spinning frame, a knowledge of how to make up a durable band is well worth acquiring. It is a well-known fact that cotton bands have a tendency to contract or shrink when the humidity is high, and to elongate or stretch when the atmosphere is dry. In the former case, there will be a considerable number of bands rupturing, entailing the temporary need for extra banders, if a loss of production is not to ensue; while in the second case slack yarn and its undesirable accompaniment, lower lea strength, are inevitable occurrences.

Mill men have for years endeavored to discover some material or combination of materials, that is not so susceptible to atmospheric changes; but cotton is still the predominating base of all the bands.

"I made some experiments in banding several years ago," a mill superintendent related, "and I finally came to the conclusion that a braided band of cotton roving was the best." What is your friend's experience?

The type of ring plates or ring holders is also worth looking into. "Give me the solid ring holder and let me center my spindles and I'll give you as near 100 per cent perfect spinning as it possible to get," aggressively asserted one spinning "fan" when asked his opinion. The writer, too, has a predilection for the cast iron ring holder, believing that its rigidity and simplicity are factors that go a long way toward giving it the advantage over the adjustable type. It is, of course, always in order to ask how the rails are leveled, lengthwise alone, or widthwise, too? And how often, and by whom?

Mill men who never visit outside their own plant, who are familiar perhaps with only the one or the other type of ring holder, obviously are not in a position to compare

the merits of the several types. So that the visit to some other mill which has a different type of holder in actual operation is often a sort of liberal education to such executives.

Such a little thing as a traveler cleaner, insignificant though it may appear, superficially, has been deemed important enough to warrant experimentation along various lines by the makers of spinning machinery as is evidenced by the several kinds on the market. How are those working in the mill you are visiting? Do they impress you as favorably as your own?

Speaking of traveler cleaners brings to mind travelers. And these hard working little bits of metal certainly deserve to be brought into the limelight, even though their whole existence is spent in going around a circle, so to say. Are they ever changed, altogether? Or simply replaced when they fall off? Have experiments been made to show conclusively whether or not better results ensue from a periodical renewing. Is the same weight traveler used in the winter as in the summer? Do the travelers run "light" when newly put on and gradually attain their proper "pull" in a day or two? Has the composition ever been experimented with to determine wearing properties and cheapness?

In connection with travelers what is the size of the ring flange? The writer has found that there seems to be a tendency to use a No. 1 flange only for medium and fine counts, the reason being that a stronger traveler can be used for the same weight.

There are some mills which do not follow the adaptability of their ring sizes for the various counts being run. Inquiry often elicits a lamentable ignorance or utter disregard of the fact that the coarser counts should preferably be run on the larger sized rings. Too often one visits a spinning room and finds the reverse is actually being practiced. Here is a point to follow up when in the other fellow's mill.

Another matter, also sometimes ignored, is that of keeping the thread guides centralized over the spindles. It was previously stated that the writer had a liking for the solid ring holder. Here, too, this style of rail is advantageously adapted toward making the task of guide centralizing a comparatively simple one. Where the movable type of plate is used, the guides have to be moved as often as the rings are shifted. Consequently, in the course of time, it will be found that the perfect concentric harmony of ring and guides is often lost.

One of the first things that the writer looks for in a spinning room is the humidifying system. Is it automatic? Adequate or insufficient? And what the type? How are the sprayers placed? Are they worked in conjunction with the windows, or is the entire humidifying and refreshing of air taken care of exclusive of the windows which then function only as light givers?

As you carelessly run your hand through the empty bobbins in a nearby doffer's box, the thought comes to mind, how does your friend test his new bobbins, and does he ever get satisfactory comparative results from the testing of bobbins from different makers? Is it a practice to put each new bobbin on a high speed spindle for the purpose of detecting vibration? Is any trouble experienced with new bobbins becoming spindle-tight after a week or so of service? Are they then reamed?

Are the bobbins exclusively of the filling type depicted in *A*, Fig. 5. If the warp bobbins, *B*, are used, have they a protecting metal band encircling the bottom? And what form of wind is used on them, filling or warp? Have experiments been made to determine whether the larger diameter of the warp bobbin and its concommitantly lesser traveler pull would permit of a higher spindle speed? A friend of the writer's has for years kept a record of the bobbins broken on the various sections of his spinning rooms, and by means of it has enlisted the active coopera-

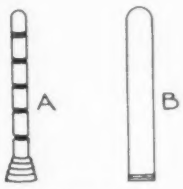

FIG. 5

FIG. 6

tion of the section hands in keeping the breakages down to a minimum—resulting in a considerable saving in the bobbin cost per year.

Asking a question about draft is often like wagging a red rag before a bull—it brings immediate action. Long draft vs. short draft is the snappy heading that has capped many a heated controversy. Obviously, if you are a short draft exponent and your friend is a long draft hound, you want him to show you how he does it. If he can do so to your full satisfaction, you will probably (mentally at least) shake your own hand, for the fact that you were live enough to get out of your own shop to see how the other fellow "gets away with it."

If he can't convince you, however, invite him over to your place, and tell him to bring his statistics and after seeing your frames turning off their nigh-century percentage of product—quantity plus quality, too, of course—you can compare costs and other data. The advantage of the long draft where it can be successfully introduced is obviously lower operating cost.

What about the twist multiplier? Is it changed for summer and winter work? Have tests been made to determine whether the present multiplier is actually the one best adapted to the needs of the product? "Many mill men lose sight of the fact that they hold one of the keys to the firm's treasury in the shape of the right use of twist," remarked one mill man; "for instance, some mills make a fetish of say 3.50 times the square. Now if they would only experiment, they would often find that a multiple of 3.25 would serve fully as well—and, of course, increase their spinning production as a consequence. And many a mill whose spinning department is running behind the rest of the works would do well to investigate the possibility of decreasing their twist multiplier." The writer is wholly in accord with this statement. What do you think? What does your fellow executive think?

Very likely the place you are visiting is one of those that has every one of the 57 varieties. Obviously, to a man running only two or three numbers, and whose experience is, that even with so few numbers mixes will occur, it is a matter of manifest interest to learn how the other fellow manages to circumvent this nightmare of the variety mill.

"Can't be did altogether," one old mill shark admitted, "but we do make every effort to forestall mixtures and we

go at those that do happen hammer and tongs until we get it cleared up."

Questions naturally follow as to how the various numbers and grades of goods are distinguished from one another. Are the numbers of hank and yarn spun promiscuously posted on each frame? Some mills have a tag system giving in detail the various data relating to the frame which experience has taught is very necessary to have in a prominent place. These are: Hank roving in creel; yarn being spun; traveler; twist; twist gear; draft gear; draft; teeth in pick gear; etc.

A textile engineer recently gave a talk on the sizing of yarn as practiced in northern and southern mills. As he was a man of wide experience and had a considerable clientele on both sides of the Mason and Dixon line, his remarks were heard with attentiveness. Outstanding was the fact that methods of sizing were almost like the leaves of a tree. No uniformity as to time, quantity, or place. Any old time, any old place, typified the sizing of some plants. Other mills were extremely fastidious about their sizings. Every box from every frame and by certain workers who sized at a place especially built for them. Some mills made it a practice to send in a man to take bobbins from frames at random every day, carrying these bobbins to the sizing department where the bobbins were sized, and the results recorded on printed forms of which a duplicate copy was forwarded to the overseer of spinning. Good mill practice favors regular sizing, and by a responsible and competent person, particularly where many counts are being spun. For this reason, it is therefore quite in order to find out how the well managed mill next door, so to say, is solving this important problem.

The writer has found that there is a tendency to make up blackboards at the place of sizings so as to compare the qualities of the yarn spun on the various sections and also on different types of frames, as well as from the several grades of cotton.

Roll and spindle speed, tied up as they are with production, form a topic of discussion wherever and whenever mill men meet. How Dick can get 1000 revolutions more from his spindles when he is running the same counts as you are and from identically the same cotton is a pointer that will do more to make you feel like going right back to your own mill and trying it out than an increase in salary would. For it is inherent with man that what another can do he wishes to emulate, or go one better still.

Associated with roll speed is the matter of lap waste. Is there a system of weighing the waste and is lap waste segregated so that an index of the running condition can be had? The writer knows superintendents who insist on a certain spindle speed regardless of the running condition of the frames. The result obviously is lap waste and lots of it. Quite as obvious is the fact that where the system is in vogue of weighing each spinner's waste attention would be directed to the fact that some machines are making an extremely large amount of waste and an investigation would disclose the cause, and the condition could then be rectified.

What is the type of lap hook used? And its composition? "Give me a brass hook every time, even if it needs frequent sharpening," is an old spinner's preference and probably that of the majority of mill men.

What is the ruling as to length of creel piecings And what measures are taken to secure adherence to it? And the penalty for violation?

One of the most obnoxious faults in yarn, no matter what the final disposition of the product, is that of fly waste. Probably the most prolific cause of this defect is that of cleaning. Whether running or stopped, ends on which the fly settles or comes in contact with will have some part of this extraneity incorporated sufficiently so that a deliberate picking off is necessary to remove the fly. Brushes for cleaning the threadboards are notorious for the amount of waste that they transfer to the ends. "Better never to use these brushes," an old timer remarked, with truth, "but rather a small wooden block just filling the space between the ends and the roller beam and having a piece of flannel attached to its lower side. A sort of threadboard clearer, so to say," Fig. 6.

Is there much trouble from single or double? Some firms are fitting their windows with a wind-shield which directs the air from the window upward, it having been found that the draft from the windows, among other things, caused quite a little double yarn.

Wherever the band driving of spindles prevails there is the ever-present possibility of old dirty, oily bands breaking and catching around a neighboring bobbin, becoming tightly wound around the yarn and leaving an imprint of dirt—often indelible. What is the procedure in regard to these bobbins? Are they picked out, put one side, and when a box full is collected, sent to the spoolers and run up for some purpose or other? Or are they immediately put into waste on discovery?

Clearer waste will often make an otherwise perfect product look like novelty yarn, and it would be well to inquire as to how the clearers are picked. Do the spinners do it? And how often? If they don't, who does? One large firm, southerly located, employes girls solely for this purpose.

A question about cockled yarn is never inopportune. To set the rolls for the best results and yet not to run into this waste maker is an accomplishment always well worth looking into. The other fellow may have something up his sleeve that will beat your method, and he may be glad to let you in on it.

Is there a ruling as to the best method of piecing broken ends? Does it compare favorably with yours? The writer has been in spinning rooms where it seemed every spinner had a different way of piecing up. The writer himself prefers the method of holding the end over the thumb, the forefinger pressing on the end almost at the thumb nail. The thumb is then pressed against the roving on the roller, the forefinger raised so that the end will slip easily along, making an almost imperceivable juncture.

It is inconceivable that two mill men should ever discuss the problems of the spinning frame very long without bringing up that absorbing topic: uneven yarn—in other words, thick and thin places. Has your friend ever tried anything to overcome this trouble? Does he believe that this evil originated in the card room and was passed along to the spinning? What about sluggish top rolls, erratic front rolls, dirty wasty skewer steps, and blunt or ragged skewer points? Has he ever lacquered the skewer points to reduce the friction?

"The spinning frames can't begin to make as even a yarn as the good old mules used to," one old mill veteran

confided to the writer. But the latter, who has handled both kinds of yarn for years, disagreed with him; for he has found that notwithstanding the shorter draft of the mule, yarn from this machine is fully as uneven as the longer drafted ring yarn.

Is there any system of recording the various faults in spinning so that an incentive is always present for reducing them to the minimum? Prominent among the spinning faults are: fly waste, bad piecings, single, double, slack twist, soft places, oily bobbins, tangled bobbins, and poorly built bobbins.

No doubt one of the most delicate questions that can be asked a spinner is that of breaking strength. Every mill man is intensely proud of what he believes to be a higher breaking strength than that obtained by his neighbor who is using a similar cotton under practically identical conditions. So that quite often a tactfully directed question or two regarding this subject will sometimes open up new vistas of possibilities for the ambitious visitor.

What is the system in regard to looking after the top roll coverings? What system prevails in connection with the bottom clearers? Have experiments been made to determine the type of cloth best adapted for the work that it is expected to do?

Since the cost of operation is so closely allied with

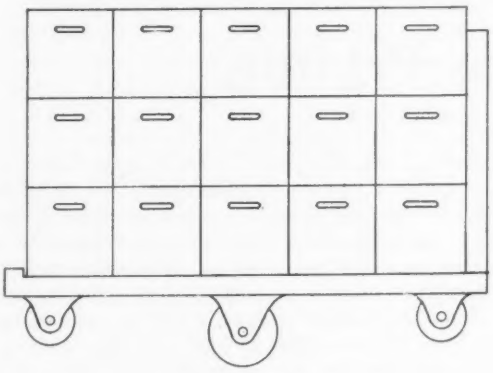

FIG. 7

profit and loss, it behooves a visitor to garner all the information that he can in regard to the numbers of workers made use of in the spinning room. How many spindles do the spinners take care of? And of what average counts? Do they do their own creeling? Or are there special workers who devote their entire time to this phase of spinning? Are there spare hands? And how many? Do the spinners have to do any cleaning?

Are the doffers boys or young men? And how many bobbins do they doff a week? Do they do any sweeping or cleaning besides their doffing? Are two or more doffers used on a frame? What is the idea of using the number they do have per frame? The writer's experience is that practice varies in regard to the number of doffers per frame, some mills having the method of only two doffers on a frame; others use four, and a few six. The plan of four doffers on a 400-spindle or longer machine is a good one; for it reduces the stoppage incidental to the practice of using only two doffers, and it gets away from the confusion resulting from having six.

After they are through doffing for a spell, where do the doffers spend their time? Each at a particularly allotted place? In groups at some open space; or (as the writer has seen them) out in the yard playing ball?

What is the equipment in regard to doffing boxes and trucks? Are they built to make it convenient for the doffers to exert themselves efficiently? Can the doffiing boxes be effectively placed in piles or on special storage trucks as in Fig. 7? Are the boxes of wood or fiber?

Examination of the bobbins for defective spinning that can be remedied immediately is one of the things that progressive firms should look into. Do they do it in the plant you are visiting?

Are there bobbin dumps, Fig. 8, for the empty bobbins?

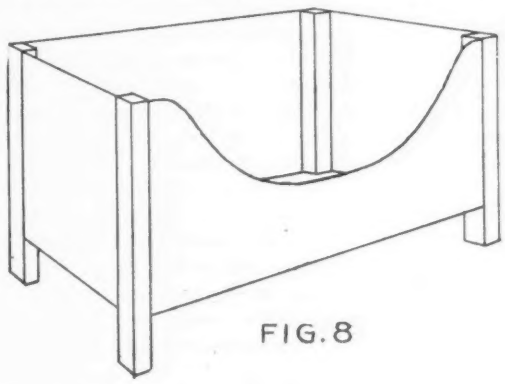

FIG. 8

And are they conveniently located, or as the writer has often seen them, in some out of the way place where much time was lost by doffers getting in each other's way when replenishing their boxes?

The tying of spindle bands and the sewing of spindle tapes is a very important item in the skillful management of the spinning room. Particularly the tying of bands requires a certain knack to do it successfully. Mill men of experience who have analyzed the banding problem know that there is as much difference between a bander properly taught and one whose training is a haphazard acquirement, as there is between a picker lap and a card sliver. What then is the system of educating correctly the band boy? Is there a foresighted policy of always having an understudy for this highly important but often depreciated duty? One glance at the mess created by a poor bander, or temporary lack of a bander, should be spur enough to

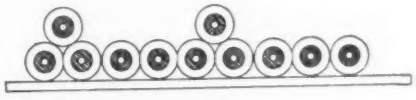

FIG. 9

cause an executive to take steps to obviate any similar situation in the future. What is your brother manager doing about it?

Another important duty is that of the roving carriers. Especially in a mill that spins a large variety of counts made from several kinds of cotton. Is the roving on pin boards, or is it laid on top of the creels like that shown in Fig. 9?

One mill manager of the writer's acquaintance is experimenting with pegs fastened to the creel top so that extra bobbins will be available at both ends and the middle of the frame, standing on end so that there is no possi-

bility of fly waste becoming an integral part of them, as is often the case when they are laid or rolled along the top board over which a heavy coating of fly has settled.

Is there a special spindle setter? Or is this work done by the section hands? How often is it done? Periodically, or is it supposed to be one of those everlasting affairs which are often found to be never really attended in a proper manner? A glance at the spindles will immediately disclose the actual situation. So, stop, look—and then listen to your friend.

How often are the spindles oiled? And how, and who does the oiling? Is there an oiler for the rest of the machinery or is this job entrusted to boys, as is so often the case? Many good dollars invested in spindles have never received the ghost of a show to earn anything like a fair dividend; and many a dollar has been spent on repairs that should never have been necessary and would not have been if a few pennies worth of oil had been rightly used —at the right times. What is the oiling system in your own mill?

What about that nondescript class of workers so often labelled with the appellation: *cleaners.* Have they well defined duties so that their time is fully taken up, or do you mentally remark that this other mill has altogether too many of these persons loafing around and draining the treasury? Can you congratulate yourself on the fact that such a state of affairs does not exist in your own mill; or do you secretly wish you could immediately "step on it" back to the old place and call in your spinning overseer asking him to bring along his pay roll, while you get your blue pencil ready to delete about one-sixth of the cleaners —the number that your visit has convinced you as being now absolutely *persona non grata?*

Are cleaners and doffers conjointly used to scour the bottom rolls, or is there a special "scouring gang" for this work? Are there scrubbers? The matter of clean floors is one which is often lamentably ignored at this stage of the making of the yarn. Only by going around to other mills can an adequate idea of this subject be grasped. The writer is a strong advocate of scrubbed floors, believing that not only does it reduce the amount of soiled yarn, but its favorable psychological effect in making good workers satisfied with their environment goes a long way toward helping a firm to turn out a maximum production of first-class quality.

EDITOR'S NOTE—This is the fifth of a series of articles by Mr. Soniaman. The questions asked are open for discussion in our regular department entitled "How Other Men Manage." All readers are invited to participate. It is not to be expected that all will agree, but it is quite probable that each man will have his *reason why,* and that is what makes it interesting.

Machine Calico Printing

BY WILLIAM B. NANSON.

It is scarcely necessary to remind the reader that compound shades made by mixing two or more standard colors together, and also colors that are reduced in strength by the addition of extra thickening paste, must always be well stirred up in order to insure their perfect incorporation. Any neglect of this elementary precaution results in uneven printing, and is inexcusable in an experienced color shop hand. With strong pigment colors it is often quite impossible to maintain the homogeneity of the color, especially if it has to be used thin. Heavy bodies like vermilion and the lead chromates cannot be prevented from settling to the bottom of the tub, or, if in the printing machine, to the bottom of the color box. All that can be done to lessen this great disadvantage is to use only the most finely ground pigments, to make the printing color as thick as is consistent with the work in hand, and to stir it up at frequent intervals both in the tub and in the color box of the machine.

(c) Thin and thick color. The quality of the impression produced by the engraved printing roller upon the cloth is largely influenced by the consistency of the color paste, and it is impossible for anyone by mere inspection to estimate with any degree of certainty the relative printing values of two colors that are thickened with totally different materials. Gum thickenings rarely or never appear to be as thick as starch, flour or tragacanth pastes, but thickness considered merely as stiffness, is not the only desirable quality in a printing color. It must also possess a certain "body," and this to a great extent, is dependent upon the density and viscosity of its thickening, in other words, upon the percentage of dry thickening material it contains, and upon the nature of that material. Gum solutions often contain three or four times more thickening than starch and other similar pastes, and, consequently, "gum" colors frequently give a much crisper and more perfect impression of the pattern than could be obtained from a "starch" color *apparently* many times their thickness. Some colors are best thickened with gum, others with paste.

Colors may, however, be suitably thickened, as far as regards material, and yet not work well in the printing machine. When this happens, the source of the trouble will usually be found to be the consistency of the color. If too thin, it gives a slovenly, blotted impression of the design, the color spreads out, by the capillary attraction of the cloth, beyond its proper limits, all the lines and masses of the pattern exhibit soft, spongy edges, the finer details run together, and the whole effect has an unsightly, blurred appearance, due to the general lack of sharp definition.

It happens sometimes that the background and other large patches of color in a printed pattern, instead of being uniform in shade, present a peculiar, irregular mottled appearance, consisting of small spots and other variously shaped objects of light color, distributed unevenly over the surface of the darker color in which they occur. This particular form of unevenness is known as "blebbing" and arises from the use of color that is too thin for its immediate purpose. "Blebbing" mostly occurs with paste colors (starch, etc.) and is not always due entirely to their excessive thinness, but to that, coupled with the unsound condition of the paste itself. On standing for some time starch and other pastes break up into a curdy-looking mass, become "watery" and lose their smooth, soft, gummy feel. If such pastes are let down with water to make thin color—a procedure often adopted—they further lose what little "body" still remains to them and although they may be beaten up and strained into a seemingly smooth paste, be-

come sloppy and quite unfit for printing. Even freshly made starch paste is apt to undergo the same transformation when diluted largely with cold water—a fact so well recognized in practice that in all well managed color shops extra thin paste thickenings are always especially boiled as required. The actual cause of "blebbing" is that, owing to the lack of viscosity or "body" in the color, the roller fails to retain a sufficient supply of it to transfer a full impression of the pattern to the cloth; in other words, the thin slushy color slips out of the engraving before the latter comes in contact with the cloth, thus causing meager, uneven impressions.

Colors that are too thick also produce very bare, weak impressions; not because there is any deficiency of color in the engraving, but because it is too solid to be absorbed freely by the cloth. Delicately engraved patterns printed with a very thick color scarcely make a mark on the cloth, and heavy patterns coarsely engraved, leave an impression, which, instead of being full and even, lies on the surface of the cloth, and shows up nearly every line of the engraving. Both of these faults are due to the same cause, namely, the inability of the color to soak into the body of the fabric.

(d) Frothing. Many colors are extremely liable to "froth" during the operation of printing, especially if a brush furnishing roller is used in the color box. The more a color froths, the lighter in shade does it become and the bulkier does it become, so that, quite apart from causing bad work, it also causes a great deal of inconvenience by overflowing the color box, and either flooding the floor or dropping into any other that may be working along with it. The froth consists of a mass of minute air bubbles mixed with the color, and this is produced by the agitation which the color undergoes in the color box, a sort of churning action kept up continually by the combined motion of the roller, furnisher and doctor. The colors most likely to froth are those containing a large percentage of gum, albumen, and other elastic thickening agents, all of which, for some little understood reason, retain bubbles of air much more tenaciously than do starch and other pastes of a similar nature. With the exception of the acetates and formates, none of the mordants in general use are capable of forming more than a temporary froth when beaten up with air, and the same may be said of the solutions and preparations of most of the coloring matters. Pigment and lake printing colors containing soap solutions or glue paste in addition to the albumen, foam up very rapidly unless they are printed at a very slow speed, and even then they soon become quite unworkable if the pattern takes up too little color to admit of the box being constantly replenished. The longer a given portion of color remains in the box the more will it get churned up, and the sooner will it become absolutely useless. The tendency of certain colors to froth may be hindered by adding to them small quantities of benzene, turpentine, or oil, and in the case of albumen colors, to further supplement these with a little ammonia. What role these substances play in preventing the retention of air bubbles by gum and albumen colors has not yet been thoroughly explained, but it is probable that they reduce the surface tension of the thickenings, and thus enable the air to escape more rapidly. In any case, although they are not perfect preventives, they at least preserve the color in working condition for a considerable time, and keep down all excessive frothing.

(e) Sticking in of colors. It quite frequently happens that some portion of a color settles in the engraving of a printing roller, and persistently refuses to leave it when the cloth is pressed into it, the result being a weak and uneven impression of the pattern. This serious defect—known as "sticking-in"—is most frequently encountered in pigment colors, Indigo, Aniline black containing insoluble salts of copper or lead, and in the numerous "discharges" and "resists" that contain China clay, zinc dust, zinc oxide, chalk, lead sulphate, and other insoluble matters; but it is also liable to occur in many printing colors which have been kept in stock too long, and in which a precipitate has been formed either by some of the constituents coming out of solution, by the combination of the mordants and coloring matters, or by the reaction of the latter with the thickening. The colors most subject to spontaneous decomposition of this sort are old Alizarin colors, basic aniline colors, Logwood and iron blacks, "steam" mineral colors and catechu browns, etc.—in short, just those colors in which the coloring matters and mordants are mixed together, and especially those that contain easily dissociable compounds or mixtures which readily form more or less insoluble lakes when allowed to stand for any length of time.

The "sticking-in" of pigments and similar colors is generally due to faulty mixing; either the pigment is too granular, or the thickening is too thin. In either case, or both combined, the cloth only absorbs the soluble part of the color, leaving the insoluble part in the engraving, where it accumulates until the whole is almost filled up to the level of the smooth surface of the roller. A thick color naturally prints better than a thin, watery one, since it holds the insoluble matter in suspension better, and thus prevents it, in a great measure, from settling; but thick colors cannot always be used in pigment printing, nor are they always effective when they can, so that where "sticking-in" does happen with a pigment color, the best remedy is to regrind it until it is in too fine a state of division to settle easily in its thickening.

All *strong* pigment colors and others that contain, of necessity, large amounts of insoluble matter, are liable to "stick in," however carefully they may be made, and from all points of view are perhaps the most difficult to print. The sticking-in may be overcome almost entirely by replacing the ordinary wooden furnishing roller in the color box by a revolving brush; but while this keeps the engraving clear of deposited color, and thus does away with one inconvenience, it tends unfortunately to give rise to another, namely, frothing—a defect which is, as previously pointed out, extremely likely to be developed in albumin and "gum" colors when a brush furnisher is used.

With regard to the sticking-in of other colors, very little can be done to remedy it. Sometimes the addition of a little oil will improve matters, but usually when a mordant color works badly from this cause it is useless, since the precipitate which ought to have been produced on the fiber of the cloth already exists in the color. Old basic aniline colors may be rendered workable sometimes by gently heating them with a little acetic and tartaric and citric acids which redissolve the color lake, but, as a rule, it is safer to make a fresh lot of color, especially if it be a light shade, and cheap in consequence. Dark and expensive shades can be treated as above, and worked off a little at a time with newer color.

Old alizarin reds are often mixed with logwood black or Persian berry yellow and a little iron mordant and then

used up as dark chocolates; sometimes they work well, but usually they scum and streak badly and cause more trouble than they are worth. Very finely divided precipitates are often quite workable, even when they are unintentionally present in a color; and if the lakes they consist of are only loosely combined with the mordants (that is, not completely developed) they occasionally yield a color very little, if at all, inferior in brightness and fastness to that which would have been yielded had the printing color been in perfect contion to start with. The cloth takes up the fine precipitate, and subsequent processes complete the reaction which started in the color itself, converting the partially formed lake into an insoluble compound which adheres firmly to the cloth. On the other hand, however, a partly decomposed color more often than not produces bad work, either by sticking-in, by giving a lighter shade than was intended, or by washing out of the cloth unevenly during the final soaping operations, which effectually remove any loosely fixed insoluble bodies that have been transferred to the cloth along with the thickening and which become detached when the thickening is washed out. It is, therefore, better to avoid, as far as possible, the introduction of precipitates, however fine, into colors that are not intended to contain them, inasmuch as such precipitates cannot be relied upon to work well, and in most cases represent a dead loss of color.

Anthracene brown, alizarin, and other coloring matters, which are of necessity applied to the cloth in the form of finely divided powders, ground up into a paste, and then thickened, often cause a good deal of trouble by "sticking-in" and this can be obviated only by thoroughly sieving them through fine silk cloth before mixing them with their mordants and thickenings, and afterwards straining the made-up printing color through the finest of "jean" cloth before sending it in to the printer. If the color works badly after this careful preparation, the fault lies with the coloring matter itself; some brands of alizarin and similar pasty colors resist all efforts to strain them; they settle into a dense, claylike mass, which clogs the straining cloth and refuses to pass through by any means whatever. When this is the case it is useless to attempt to make workable printing colors out of them; the only thing to do is to return them to the maker, they are absolutely unfitted for printing purposes, and, as a rule, either too expensive, or the wrong shade for use in the dyehouse.

Unworkable precipitates are also formed in printing colors by the irrational mixing of two or more colors to produce a compound shade. In order to avoid this it is advisable to use, as far as possible, for compound shades only such colors as are fixed by the same mordants, and which possess a strong family likeness as regards fastness to light and washing. In this way mixtures may be obtained which not only work as well as any one of their constituent colors, but which possess the further advantage of behaving as a single color when subjected to the action of soap or light; that is, they fade or wash out evenly, without undergoing any very great alteration in general tone. On the other hand, mixtures of "fast" and "loose" colors can never be depended on to give regular results; and as they not infrequently belong to quite different classes of color stuffs, they are apt also to combine with each other, forming insoluble bodies difficult to work; in consequence, colors differing widely in general properties ought not to be mixed together unless the effect aimed at cannot possibly be attained in some other way.

It will be seen from what we have said that the technical perfection of a calico print works depends in a great measure upon the proper preparation of the color paste; that is to say, upon its physical nature, thickness, softness, freedom from grit, etc., as distinguished from its chemical compositton.

In order to avoid most of the mishaps caused by faulty printing colors it would be well to observe the following precautions:

(1) The water must be good; it must be examined for dirt and fine sand, and, if not free from these impurities, it must be filtered clean. Condenser water is best as this is absolutely pure.

(2) All gum thickenings must be allowed to settle as long as possible before using as they all contain more or less sand and grit.

(3) All insoluble constituents and pigment colors of a printing color must always be ground to the finest division possible or they may "stick-in."

(4) Starches and flour known to be gritty and all bodies that form gelatinous or flocculent precipitates on boiling, should be mixed with cold water into a thin milky fluid and then strained by shaking through a fine straining cloth before being boiled or used for thickening purposes. Such impurities are extremely difficult to strain out after boiling.

(5) All colors thickened with dry starch or flour must be well boiled first and then thoroughly cooled before the mordants are added, or the result will be a badly working color.

(6) All soluble bodies must be completely dissolved; if they are coloring matters they must also be passed through a fine silk sieve into the thickening paste to avoid "specks."

(7) Whenever a small quantity of one color is added to a large quantity of another color it must not be thrown in at once, but must be gradually diluted with successive small portions of the larger quantity, until it can be safely mixed, without any fear of its being unevenly distributed throughout the mass.

(8) All colors of course must be thoroughly well strained and stirred up before going to the printer.

(9) All color tubs must be thoroughly clean and well rinsed out before receiving their contents.

All these rules may be regarded as insignificant but for all that their observance constitutes one of the fundamental conditions of success in all calico printing operations, especially in the color mixing. No mater how perfect a color may be in other respects, if it be compounded without due regard to its working qualities it is practically certain to possess one or the other of the defects already noted; careless color mixing always results, sooner or later, in bad work, damaged rollers, spoiled cloth, and a consequent loss of time and material.

Thickening Pastes.

I may say that the following thickening pastes are in general use and represent those employed throughout the whole calico printing industry. There are of course unimportant modifications of these, for instance, two or more thickenings may be mixed together, or a mixed thickening may be boiled at one operation. These points are matters of local experience.

The following thickenings may be used both for making standard colors and for diluting or reducing the same:

(1) Starch paste, 15 per cent, use—

1500 grams wheat starch

8100 grams water
400 grams cottonseed oil

10,000 grams.

Boil and cool. Used for thinning down or reducing all kinds of color pastes containing no alkali and as a general thickening for basic colors.

(2) Acid starch paste, 20 per cent, use—
2000 grams wheat starch (corn starch will answer)
5500 grams water
2200 grams acetic acid, 9 degrees Tw.
300 grams cottonseed oil.

10,000 grams.

Boil and cool. Very useful for dark basic colors and such as require acetic acid for their solution.

(3) Starch tragacanth paste.
1000 grams wheat starch (corn starch will answer)
3000 grams water

Mix in the cold and add
6000 grams tragacanth thickening, 6 per cent.

10,000 grams.

Boil and cool. For thickening diazo solutions, and when thinned down, a suitable thickening for medium blotches.

(4) Acid starch tragacanth paste.
1200 grams wheat starch (corn starch will answer)
6000 grams water

Mix in the cold and add
2000 grams tragacanth thickening.
800 grams acetic acid 9 degrees Tw.

10,000 grams.

Boil and cool. To be used for reducing basic colors, and for general use where a soft acid paste is required.

(5) Flour and tragacanth paste.
2000 grams flour
600 grams acetic acid 9 degrees Tw.
4000 grams water

Mix in the cold and add
3000 grams tragacanth thickening 6 per cent
300 grams cottonseed oil.

9,900 grams.

Boil and cool. This paste is used for printing the insoluble azo colors, and for reducing "madder colors," that is, the thickened solutions of the iron and aluminum mordants. It possesses a good deal of body, and at the same time is soft, and penetrates better than most thickenings of the same consistency.

(6) Alizarin red paste.
1500 grams wheat starch
7000 grams water

Mix in the cold and add
700 grams acetic acid 9 degrees Tw.
500 grams tragacanth thickening 6 per cent
300 grams cottonseed oil.

10,000 grams.

Boil and cool.

(7) Reducing paste for alizarin pinks.
1000 grams wheat starch
7100 grams water
500 grams acetic acid 9 degrees Tw.

Mix in the cold and add
1000 grams tragacanth thickening 6 per cent
400 grams cottonseed oil.

10,000 grams.

Boil and cool.

(8) Gum Senegal thickening 50 per cent.
5000 grams gum senegal
5000 grams water

Allow to soak in the cold 24 hours and then boil up.

Take the solution out of the pan, boil, and filter it through a straining cloth into the storage tubs. There let it settle until all the sand and grit are deposited, when it is ready for use. Gum Senegal is the best thickening to use for light "blotches" when price is no object, it gives beautifully level shades which possess a soft, delicate quality unapproached by any other kind of thickening, except of course, the other natural gums—arabic, gedda, etc. These latter are prepared in precisely the same way as gum Senegal.

(9) British gum thickening. The percentage of British gum varies wth the degree of calcination. A moderately torrefied starch yields a good paste at 350 grams per kilo.
350 grams British gum
650 grams water

Boil and cool. If the gum is acid it must not be boiled. British gum is used in place of the more expensive gum Senegal for all kinds of discharges, etc.

(10) Tragacanth thickening 6 per cent.
600 grams gum tragacanth
9400 grams cold water

Allow to soak 24 to 30 hours, and then boil until it becomes quite smooth. Used in combination with other thickenings, and also alone, for many colors which are required to penetrate well into the fabric.

(11) Alkaline thickening.
1500 grams British gum
8500 grams caustic soda 77 degrees Tw.

Mix in the cold and then heat to 140 degrees F. Used for Indigo, sulphur colors, most of the vat colors, and for discharging tannin mordanted goods.

(12) Albumen solution 50 per cent
1000 grams egg albumen
1000 grams cold water

2000 grams.

Dissolve in the cold. Blood albumen is usually made in a 40 per cent solution. Both are employed for fixing pigment colors.

(13) Paste for reducing acid resists.
1000 grams China clay
1000 grams water

Grind to a fine smooth paste and add
2500 grams British gum
5500 grams water

10,000 grams.

Boil and cool.

The thirteen pastes or thickenings given herewith include all that may be considered as standards. Other mixtures may be made as required, and the various proportions and ingredients modified as occasion dictates.

(This is the sixth of a series of articles on this subject. The next will appear in an early issue.—Editor.)

The Voice in the Gizzard

BY U. DODGE.

This is a tale of a worm that turned. Worms sometimes do, although in this case it was the head end of the worm that turned and missed its chance, while the tail kept going and arrived according to schedule. Which, after thinking it over, probably proves that the head does not always govern wisely, that reason should not always rule, and—but form your own opinion, and remember that the tail of the tale will bear watching.

This was one of those long, slim, slick sort of worms that seem to be made for the express purpose of giving a form fit to a fish hook with the least possible alteration; the kind that school books tell us can be cut in two and still continue to live as separate entities, each portion automatically fitting itself up with a new head or tail as required, just as if nothing at all had happened. In other words, the only thing in the world outside of a political party and some mill men that can go two ways at once and think nothing of it.

This particular worm was on his way to the top of the ground one morning about sun-up to take a look at the weather, when, as might be expected, he stumbled into the early bird. Of course it served him right for being up so early, and the head part, having whatever brains there was, realized its mistake and turned back for home in a jiffy, but the tail was sort of slow getting the idea, and before it could get out of sight the bird pecked right down on him and converted him into an improper fraction. Naturally the numerator kept going and was soon lost to sight and fame, but the denominator had a different idea. He had never been up top before and he liked the view. He decided to stay if he could, but he didn't have much time to think about it because that bird kept working on him so persistently that he had to skip around pretty lively to keep from being a sort of involuntary breakfast. This went on for a while, until, not having had time to grow a head yet, that tail end didn't have any more sense than to get mad about it and jump right on that early bird.

The result was, to say the least, disastrous. Before that bird realized just what was going on he found himself so wrapped up around the legs and lambasted over the head and abused generally that he lost his appetite completely and had no ambition at all except to get away from there. In fact, he got so sick of that worm that while he was flying off over a little pond of water, he threw a fit and was gobbled down by a cat fish that had caught a cold and felt in need of a stimulant.

In the mean time the tail end had begun to find out a few things. Worms, it appeared, were not recognized socially, no matter how excellent. His status, like that of the modern hot dog, depended largely on the appetite of the casual acquaintance and his own gustatory desirability, which was not particularly inspiring. He soon managed to grow a head on the end aforesaid—or maybe it was the other end—which was easy enough, but that didn't seem to be sufficient. In order to get along in the world he had to be something more than a worm, something bigger and better. He had, in fact, to change his nature and quit being a worm altogether, and as a first step in that direction he started in to grow a few arms and legs like the other inhabitants of his neighborhood, and a little brains too, if possible, and he was very successful in his endeavors as almost always happens to those who try hard enough—all except the brains.

During the process he must have split into a variety of sections, and these in turn divided into others until in the end—or maybe we should say in all the different ends—there were quite a number of him, all equipped with hands and feet and very often a large dignity and sense of importance, but not much brains. And a few of him got into the mill business.

Willie the Worm was one of them. That wasn't his real name of course, but he had been answering to it when he answered at all, ever since he could remember, for no apparent reason except that he just looked that way. He was a shambling sort of aggregation of joints and knuckles, with an uncivilized head of hair, spasmodic whiskers and hand-me-down clothes, who shuffled around with his eyes and his mind both out of focus most of the time because he had never learned to use them, and his mouth open all the time because he had never learned to keep it shut. He was, in fact, beautiful but dumb, and he ran a draw frame because he didn't know how else to make a little money, and the boarding house lady wouldn't feed him unless he did. Take a look around your room and you'll see several of him.

In Willie's case, however, there was an important though hitherto unsuspected difference. He was a worm divided against himself. His head end kept telling him that he was all right, but he couldn't seem to get a unanimous vote. Something down around his heart or his gizzard, or wherever it is that you get the funny feeling when the elevator begins to drop, kept telling him about himself, and Willie could not but agree that it was sad but true. "You're all right," his head would say. "You've got a nice job that you can run all right without any effort. You get your money when you work, and you don't have to work much to pay your board and have fifty cents left over for cigarettes. You're a real handsome boy, anyway, and it won't be long before an overseer's daughter or some other rich girl will come along and fall in love with you, and then you won't have to work at all."

And then his gizzard would have a cramp and he would hear a little voice 'way down in his differential say, "You're nothing but a big hunk of cheese, and not very good cheese at that. You haven't had a shave since Christmas and the scissors you trim 'em with are so dull they leave you looking like a newly hatched gosling. You never owned a new suit of clothes in your life, and you haven't had a pair of socks since the ones you found in your waste can wore out. Your shoes are so bad you have to take them off to work and you're too dratted sorry to get yourself a wintertime hat. Everybody's laughing at you now for wearing that old straw. It's all right to say that your hair's so long that your head's not cold, but you know you're afraid to go on the street for fear some barber will run you down and drag you off to the Board of Health. As for any girl taking a look at you, if one did, she'd either die laughing, or if she took you seriously they'd

have to take her to the funny house and she'd laugh herself to death anyhow. You—"

But Willie knew all that by heart, and what hurt him was that it was so. Finally he got enough of it and right there was where Mr. Earle Y. Byrd, the overseer, got the shock of his life. As he was passing Willie's job he heard a voice say, "Hey, how about me learnin' to grind some of them there cards?" He looked around to see Willie holding his middle with an alarmed expression, and then they both fainted dead away, the overseer from surprise and Willie from embarrassment. But in the end Willie got his chance.

All this was in the good old days before they began to have a lot of new-fangled foolishness around the mills like revolving flat top cards and vacuum strippers and such like. Willie's draw frame was a three-end-into-one contraption that had a good deal of psychology connected with it whenever it would run, and he got his back drawing from a fearful and wonderful arrangement of belts, gears, cones and cuss-words that stood at the end of a row of cards like a drill sergeant stands by the awkward squad, which was called a railway head, just why, nobody has ever been able to find out.

Those were the days when men were men. You didn't strip a card with one of these vacuum things, nor yet with a wire brush. No sir. You got on top of it and you manhandled it with a curry comb and you told it what you thought of it while you were at it. If you didn't you were probably too much out of breath, but at that you missed a good chance. The tops were wooden slats with a few moth eaten teeth on the under side and they were stripped by a joint perpetration of the devil and some misguided mechanical genious which was made to lift them up one at a time, scratch their stomachs and slap them back in their holes. That is, it did when it did, but most of the time it didn't. Now you know what kind of a job Willie fell heir to one morning when the overseer told him that one of the old grinders had died of despair, one had quit in disgust, one had laid out with distemper and that he could have a try at it if he wanted to.

His head end promptly went on a strike, but the rest of him waded into a section with the bright and cheerful manner, that most people use when they are going to see the dentist, and stopped a card that had been left grinding, took the roll off and set it up. Willie didn't know much about setting cards, but he had watched the grinders lots of times and he managed to get it together again, and when he started it off he pulled out a little piece of sliver and held it up to the light. He didn't know just what that was for, but he had seen the others do it and thought that was part of it, so he did it too, so as not to miss anything. Right there was where his head began to revive and put in a little work.

"What are you doing that for?" it wanted to know. "Trying to make a show of yourself? Look at everybody laughing at you. Look at the fixer on the draw frames stuffing a wrench in his mouth so you won't hear him holler. How come you think you can run a job that belongs to your betters? Now here comes the overseer, and you'll see right where you get off."

Old Early Byrd took the little piece of sliver away from Willie and gave it a contemptuous look. "Boy," he said, "you sure are a wonder. That card's putting more trash in the work now than there is in the cotton. You take down another card, and I'll skin you all over. Watch these belts and keep them on, but that's all. Don't you bother none with these slat strippers. If one of them things gets out of fix you call somebody. You wouldn't get it straight in a thousand years."

The only grinder left on the job came over and added a little consolation. "That's fine," he said looking at the sliver. "In couple hundred years more or less you ought to make a good grinder. Just you wait for one of them there strippers to get out of fix. You'll think you've fell into something sure enough. Hey, look! There's one now. Well, I'd help you with it but I ain't got time. Let me know when you get it going again."

"Aha," said Willie's head, "now look." He looked. One of the flat strippers had disagreed with itself. Its two ends were having an argument between them as to which way was yonder way, and being of different minds had started in different directions. The result was terrifying. "Leave that be" said Willie's brain works. "Go tell the boss," but his gizzard began to get unlimbered just then and it had something to say. "Cheese!" it howled. "Cheese in chunks. I always said so. Cheap cheese at that. Wor-r-r-my cheese. Yah, Go jump in somebody's ash can." Then the overseer came along and pecked him in two.

"Don't you put a hand on it," he said. "I'll get a man—"

Willie the Worm lost his head. Where it went nobody knows, but it flew off and kept going and never has come back. It's probably still traveling as hard as it can roll to the place where the absolute zero stays and all the old ravelled out neverwasers congregate and jaw at each other about the chances they got cheated out of. In its place it left something round and very hard which could be used for driving nails or breaking rock or butting goats out of the way or any thing like that, and the only thing that can be said in favor of it is that it is directly connected to Willie's gizzard. "You got a man" he shouted, "and I'm him. I'm going to fix that thing or fix it so nobody else ever will. I wish you'd move. I need elbow room and you're right in the way. When I need any help, I'll send for you. Go on now, and don't bother me. I'm busy."

Early Byrd got, assisted by an elbow against his wishbone, and then the grinder happened by to say something and hurt Willie's toes against a lot of wrenches he had in his back pocket. He hadn't meant to do that, so when Willie started to put his shoes on he got out of the way too. Then things began to happen to the slat stripper.

First it was a wreck, then it was a mess, and then it was but a sickening memory of a once proud and persistent stripper. Dinner time came and went, but not for Willie. After that the patient began to mend and by stopping time was so far improved as to be able to resume its duties, rather uncertainly perhaps, and in need of assistance at times, but still with a definite promise of convalescence. One pair of pliers was broken, one hammer handle was frayed out like a whisk broom, one screw driver was lost down a crack in the floor. Willie tapped a butterfly gear in place with the last remaining wrench, sailed it at the sneering face of the grinder which was peeping over a nearby card, watched it bounce off the top of the card and out of the window, slammed down the lid of the empty toolbox

and went home hungry and happy. On the way he met the overseer and offered an apology.

"Sorry I talked so to you sir," he said. "It wasn't me at all. My gizzard gets out of control, you see, and makes me do that. I'd like to keep the job, if you don't mind."

"He's nutty," said Mr. Byrd to the grinder next morning as he inspected the print of a wrench on the latter's anatomy. "Been handing me some stuff about his gizzard being out of order, but he fixed that stripper, and I ain't got anybody else to put on the job, so I'll have to let him stay. Better not keep any wrenches in your back pockets for a while until that gets better, and stay out of his way. He's got him a new pair of shoes, but I don't see where he needs 'em. If his determination is as hard as his feet, he ought to make a good one, time he learns."

So that's the head end of this story, which really doesn't amount to much. If you forget it, you're not out anything, but here comes the tail end which you should hang on to. Harken therefore to these words of wisdom.

The human gizzard is the most important organ yet discovered, and it's an unlucky worm that hasn't got one. The fact that the doctors say folks don't have them has no bearing on the case. We have lots of things you can't put your finger on. There's complexes, for instance, and grouches, and hang-overs from last Saturday night. You've never heard of anybody going to the hospital to have any of those things taken out, but we have them just the same.

So with gizzards. 'Way down deep inside of you somewhere there is a hard headed sort of voice that has a habit of making itself heard at inconvenient intervals. Better hang on to it and give it due consideration, because it's the only really honest thing you've got. You can fool your fellow workers, your boss, and—maybe—your wife, but once in a while when nobody's looking, this little voice stands off to one side and takes an impartial view. "What a mess!" it says, meaning you, which is doubtless discouraging sometimes and might be harmful if it didn't possess a redeeming feature. Whatever grit you may happen to possess is there.

It has to tell you right, you see, but then it can help you too. Discouragement is what it eats. Laziness and procrastination, vacillation and doubt is what it gets fat on. It claws 'em up and converts 'em into pep and confidence and ambition. It starts you off and keeps you going. It grinds off the rough places and puts sand on the slippery slides so you can climb them and after that it helps you to hold on. After all, you have to pay some attention to the only thing that really knows how "sorry" you are, and still loves you.

From the worm that refused to turn back on through to Willie the Worm was a long step. From Willie who was the Worm to the card grinder that he made of himself was a longer one, and he has been stepping some since, because he's a superintendent now and wears shoes all the time and straw hats only in season. What's more, some girl did come along and take a notion to him after all.

Last time I saw him I asked him what he blamed his success on more than any other one thing and he answered "Grit." Then he told me all about this gizzard business which I'm passing on to you because it's too good to keep. I asked him what started him off wanting to be a grinder in the first place, and he grinned a foolish grin and said, "Well, you see, I'd already had a sight or two of the young lady, and you know how it is." Which, as the saying is, accounts for the milk in the cocoanut, or, we would probably say in this case, the grit in the gizzard.

Notes About Men You Know or Know About.

Although S. Y. Austin has removed to New York City as vice-president and general manager of Callaway Mills, Inc., his many friends in the South are interested to know that he will maintain rather close contact with the southern mills, controlled by the Callaway interests, which this selling organization serves.

Mr. Austin's connection with the southern textile industry dates back to 1898, and since that time, he not only has risen to a position of importance as a financial and operating executive and authority, but his engaging personality has endeared him to his numerous acquaintances in all branches of the industry.

Leaving school at the age of sixteen, Mr. Austin became associated indirectly with the Porterdale Mills, now a part of the Bibb Manufacturing Company, at Porterdale, Ga. In 1899 he went to the Whittier Mills Co., Chattahoochee, Ga., where he served for ten years in various capacities—as electrical engineer, yard foreman, overseer of carding, and superintendent. On January 1st, 1909, he became associated with the Callaway interests, in LaGrange, Ga., as superintendent of the Unity Spinning Mill, which was erected under his supervision. In 1914 and 1915, Mr. Austin supervised the construction of the Hillside Cotton Mills, and in addition organized the Valley Waste Mills.

Mr. Austin is recognized as an authority on waste and waste manufacture and utilization, having devoted a great deal of study and thought to the subject in America and abroad. He made a four-months' tour of the cotton mill industry of the British Isles and the European continent just prior to the organization and erection of the Hillside mill, and went abroad in the summer of 1921, when he made a further study of European mills.

In his new position as vice-president and general sales director of Callaway Mills, Inc., Mr. Austin will have charge of the sales of this organization, which acts as selling agents for the Unity Cotton Mills, Milstead Manufacturing Co., Elm City Cotton Mills, Manchester Cotton Mills, Hillside Cotton Mills, Unity Spinning Mills, Villa Rica Cotton Mills, and Athens Manufacturing Co.

W. P. BOWDEN, who has been with the Griffin Manufacturing Company some forty years in continuous service, probably has the distinction of being overseer of dyeing with one company longer than any other man in the industry. At the close of a banquet given by Mr. Bowden on December 19th, J. P. Nichols, president of the company, presented Mr. Bowden with a gold-headed cane as a gift from the company and a token of appreciation for his long, faithful and meritorious service.

C. T. LASSITOR has accepted a position as traveling representative for Penick & Ford, Ltd., Cedar Rapids, Iowa, manufacturers of "Douglas" textile starches. He will make headquarters at Greensboro, N. C. Guy L. Morrison, Greenville, S. C., is southern representative.

W. L. STEPHENS, overseer of weaving at the Sylvan Cotton Mills, Shelbyville, Tenn., has resigned to accept a similar position at the Avondale Mills, Alexander City, Ala.

Cotton Wax—An Impurity of Raw Cotton

BY G. E. VAN TROMP GOVIER.

Natural cotton will not readily absorb water; placed in a vat of water it persistently floats, whereas cotton which has been bleached will immediately absorb the liquid and sink. This is due to the impurities with which the fiber is both impregnated and surrounded, and in particular to the waxy, or fatty substance which has been termed "Cotton Wax." These substances form an almost waterproof film over the surface of the fiber, and constitute a most important factor in the efficiency of warp sizing.

The cotton fiber, freed from the various impurities, may be termed pure cellulose, analogous to the cellulose of wood and starch. This constitutes approximately 86 to 87 per cent of the natural cotton, the balance being a number of organic and inorganic substances which are accumulated during the formation of the cotton in the boll.

The following example of the results of an examination of raw cotton serves to illustrate its composition:

	Per Cent	
Anhydrous Cellulose	86.908	
Natural Moisture	8.020	
Fatty Matter	3.987	i
Calcium Carbonate	0.146	i
Potassium Carbonate	0.495	s
Potassium Chloride	0.086	s
Potassium Sulphate	0.099	s
Calcium Phosphate	0.092	i
Iron Oxide	0.043	i
Magnesium Phosphate	0.091	i
Sodium Chloride	0.024	s
Unaccounted for	0.009	
	100.000	

Substances which are insoluble in water marked i.
Substances soluble in water marked s.

It is intended in this article to discuss only the impurity termed "Fatty Matter" in the foregoing analysis

The first real constructive research recorded on this subject was carried out by the late Dr. Edward Schunck, of Manchester, England, who, in 1871, thoroughly examined raw cotton with the object of isolating the substances other than cellulose present in the fiber. He boiled cotton yarn in a kier with soda ash and acidulated the liquor with sulphuric acid. From the resulting precipitate he isolated:

(1) "Cotton Wax."
(2) Margaric Acid.
(3) A coloring matter readily soluble in alcohol.
(4) A coloring matter sparingly soluble in alcohol.
(5) Pectic Acid.
(6) Miscellaneous Albuminous Matter.

In all Schunck is stated to have accounted for a little less than 0.5 per cent of the impurities.

In subsequent years the pioneer work of Dr. Schunck has been followed by the researches of Allen, Fargher, Hall. Higgins, Knecht, Piest, Probert and Streat.

Knecht and Allen (Journ. Soc. Dyers and Colorists, 142, 1911) obtained a quantity of the crude wax from cotton and separated it into two fractions by means of petrolic ether; the soluble fraction constituting about 70 per cent of the crude wax. The melting point was between 66 and 67 degrees Centigrade. It contained a small amount of combined glycerin. The fraction insoluble in petrolic ether was dark green in color, and plastic, with a melting point of 68 degrees Centigrade. Knecht and Allen further separated the fraction soluble in petrolic ether into two portions, by boiling with 96 per cent alcohol. The portion insoluble in alcohol (18.8 per cent) was a glossy wax with a melting point of 78 degrees Centigrade, and having an iodine value of 11.28. The portion soluble in alcohol had a melting point of 62 degrees Centigrade and an iodine value of 33.42. The wax contained 47.5 per cent of unsaponifiable matter from which the authors isolated phytosterol, the acetate of which melted at 127.2 degrees Centigrade.

In 1912 Piest carried out researches on the wax in raw American Cotton (Zeits. f. angew. Chem. 1912, 396) and by means of different solvents extracted various fatty bodies, the solvents together with the quantities extracted by each being as follows:

	Per Cent
Absolute Alcohol	1.23
Benzene	0.87
Ether	0.74
Petrolic Ether	0.50
Total Extract	3.34

Piest stated that the saponification value of the alcoholic extract was 159, while it had an iodine value of 22.1.

Knecht and Hall (J. Soc. Dyers and Colorists, 34, 220-7, 1918) extracted raw cotton with mechanical solvents in a Soxhlet extractor. They used benzene, alcohol, water, dilute ammonia, dilute formic acid, and finally extracted with 2 degrees Tw. hydrochloric acid in a beaker. They repeated these extractions on a larger scale using large quantities of 2-ply 60s American and Egyptian cotton yarn, in a big copper Soxhlet extraction apparatus. They confirmed their previous results excepting for slight quantitative differences. They stated that Benzene extracted 0.40 per cent from American cotton and 0.444 per cent from Egyptian cotton. They separated these extracts into portions soluble and insoluble in petrolic ether.

Tests on tensile strength of the yarns showed that removal of the wax increases the strength but diminishes the elasticity of the yarns.

Knecht and Streat (J. Soc. Dyers and Colorists, 39, 73-7, 1923) suggest that only a portion of the cotton wax is on the exterior of the fiber, and that the remaining portion of it is only removed completely by disintegration of the fiber.

S. H. Higgins, in an article entitled "The Constituents of Raw Cotton" (J. Soc. Dyers and Colorists, 39, 150-1, 1923) gives some further information on the amounts of extracts obtainable from raw cotton with the use of different solvents, together with some results of the solvent extraction of flax.

In a very detailed description of an examination of the benzene extract of American cotton, R. G. Fargher and M. E. Probert (J. Textile Inst., 14, 49-65T, 1923) state that they treated American cotton in sliver form with redistilled 90 per cent benzene, heating with superheated steam. This made possible undesirable saponification, and, by condensation of steam, the extraction of other materials. The crude extract, freed from water and volatile hydrocarbons,

was successively extracted with light petroleum, ether, benzene, alcohol, and chloroform, and divided into portions sparingly and readily soluble in a given solvent. The authors isolated a new alcohol, for which the name gossypyl alcohol is proposed (from *Gossypium* spp.). They also isolated montanyl alcohol, ceryl alcohol, carnaubyl alcohol, and a mixture of phytosterols. The following acids were found to be present: palmitic, stearic, oleic acids occur in the free state. Montanic, cerotic, palmitic and stearic acids occur principally as sodium salts, while carnaubic, palmitic, stearic, oleic, and a lower isomeride of oleic acid occur as esters. The proportion of unsaturated fatty acids is small. A further acid $C_{84}H_{68}O_2$ was found present. The authors suggest that this acid is probably identical with an acid of the same composition and melting point isolated by Schalfeef (J. Russ. Phys. Chem. Soc. 96, 325. 1876) who stated that melissic acid from beeswax was a mixture from which an acid $C_{84}H_{68}O_2$ could be isolated by repeated crystallization from ether, and fractional precipitation of lead salts. The corresponding incarnatyl alcohol was isolated by Sundwik (Zentr. Physiol. Chem. 26, 58. 1898) from bumblebee wax, and by Rogerson from the flowers of *Trifolium Incarnatum*. Hydrocarbons isolated by the authors were crystalline triacontane and hentriacontane from Upland cotton, heptacontane from Mississippi Delta cotton, and triacontane from Egyptian cotton.

The analytical constants of the three cotton waxes extracted from the three varieties of cotton are as follows:

	Upland	Mississippi Delta	Egyptian
Melting Point	80°C	76°C	80°C
Specific Gravity	1.005	0.976	0.992
Acid Value	21	28	28
Saponification Value....	76	56	70
Acetyl Value	48	84	83
Iodine Value	20	27	26
Unsaponifiable Matter...	66%	68%	57%
Acetyl Value of Unsaponifiable Matter	117	124	115

It will be seen that the natural wax of cotton is an extremely complex material. It is in no way similar to the oil extracted from the cottonseed, an idea which is very prevalent.

There is no doubt but that the natural wax of cotton is an important factor during the processing of cotton goods. It should be of very great interest to the spinner as in all probability it functions as a lubricant for the hairs in the process of spinning, and, in fact, in the preceding processes. To a certain extent it must cement the hairs in the spun yarn.

In warp sizing it is a very important factor, particularly in connection with the penetration of the size. As previously stated, the natural cotton contains approximately four per cent of wax, in the form of a film on the surface of the fiber, and evidently also firmly fixed in the interior of the hairs. It has almost a waterproofing action, as cold water penetrates the film with difficulty. It is very doubtful if, in the process of slashing, the size mixture actually penetrates this film of wax. To a certain extent the heat of the size may loosen the film, and a portion of the wax be removed by mechanical movement, but it is evident that the greater portion of it remains intact. It would appear, therefore, that the size adheres to the waxed surface of the fiber, and that there is no penetration of the size into the fiber, but only between the interstices of the fiber of the yarn. A pretreatment of the yarn before entering the size box, with a substance which would loosen this wax film might possibly result in size more firmly fixed to the fiber, and therefore less shedding. On the other hand, the elasticity of the yarn would probably be impaired.

The cotton wax also is a factor in bleaching and finishing. It protects the coloring matter of the cotton from the action of the chlorine used in the latter stages of bleaching. Its absolute removal is necessary, and being such a complex mixture, it is no easy proposition to remove the last traces. Solvent soaps have proved very successful in dealing with this problem. The character of the cotton wax indicates that emulsification must be brought into play to insure its removal during the process of scouring.

Patents have been taken out in connection with this problem. The Rockland Finishing Co., Inc. (British Patent 172,633, Dec., 1921) remove natural waxes and oily substances from cotton fiber, yarns and threads and fabrics without the usual bleaching operation and its consequent weakening, by dissolving with ether, gasoline, benzene, or similar solvents, or by emulsifying for a sufficiently long period with soap, or by saponifying with weak soda. E. Knecht (British Patent. 195, 870, April 10th, 1922) has patented a method for softening the natural wax in cotton by treating the dry cotton either in the raw state or in any stage prior to the actual spinning process with air laden or charged with the vapor of a hydrocarbon such as solvent naptha, hydrogenated tar oils, petroleum oils, oil of turpentine, rosin oil, tetrachlorethane, chlorobenzene, phenetole or like solvent.

In cotton wicking for kerosene lamps and stoves, this wax and oil impurity greatly impairs the capillarity of the wick, and causes irregular burning. A more brilliant flame can be obtained from wicking that has been boiled to loosen these waxes. Some manufacturers resort to a boil with a one per cent solution of oxalic acid, afterwards centrifuging and drying the wick. Others boil with a weak solution of soda ash and ammonia. In either case the wax film is destroyed, and the fiber rendered more absorbent.

Undoubtedly the presense of these impurities in the cotton are of much greater significance in the processing of cotton goods than is generally realized.

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Comparative graphs on building construction costs for each year for the past decade are included with the January edition of The American Appraisal News, published by the American Appraisal Company, Milwaukee, Wisconsin. The United States is divided into six major sections, and the trend of building cost given yearly for frame, brick (wood and steel framing) and reinforced concrete construction.

PREVIOUS PAGES BLANK

Why do good salesmen object to rubber-stamped cards?

A Manufacturer Says—

BELL PHONE, GARFIELD 0151

Logan Hosiery Company
Manufacturers of Full Fashioned Silk Hosiery
3213 FRANKFORD AVE.
PHILADELPHIA, PA.

November 28, 1924.

Kaumagraph Company,
350 West 31st Street,
New York, N.Y.

Gentlemen:

Ever since manufacturing Kalonia Blue Line Hosiery we have found that Kaumagraph dry transfers afford the proper means of identification of our merchandise.

This stamp insures the users of Blue Line Hosiery against substitutions of inferior qualities of hose.

We safely recommend Kaumagraph dry transfers for any product on which a mark of distinction is required.

Yours very truly,
LOGAN HOSIERY COMPANY
Harry Leibold
Secretary

HL/K

A TRADE MARK put on clumsily, illegibly, is the same sort of handicap to sales as a cheap rubber-stamped business card is to a salesman.

Big manufacturers know this. That is why you find the leaders everywhere using beautiful Kaumagraph Transfers to mark their goods.

The Kaumagraph method of marking has these outstanding advantages:

—it is easy and quick to apply
—the result is a neat, handsome mark
—the imprint lasts

Our new lithographic department now enables manufacturers to get their labels, hang tickets, etc., and transfers all from the same source.

Write to us for full information about this Service and for sample markings of the transfer itself.

KAUMAGRAPH COMPANY
350-356 West 31st St., New York City

Canadian Branch, Kaumagraph Limited, Paris, Ontario
BOSTON CHICAGO PHILADELPHIA CHARLOTTE, N. C. PARIS, FRANCE

Trade-mark your textiles, hosiery, etc., with
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KAUMAGRAPH CO.,
350-356 West 31st St.,
New York City.

Please send us full information about Kaumagraphs with samples.

Name _____

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to the Spools you Replace

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The right selection of replacement spools figure to a great extent in the profit you make.

U S Fibre Head Spools were designed to give the textile industry certain advantages that wooden spools do not possess—such as toughness for a thin head, allowing a greater traverse for the same length overall, freedom from rough edges for a greater length of time and their adaptability for certain kinds of work.

Give thought to the spools you buy—consider the above points of U S Fibre Head Spools before making a decision. Write us for samples and see for yourself just what they will do.

Other U S B & S Co. Products

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Underclearer
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FLAX SPINNING
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TRIPTODS

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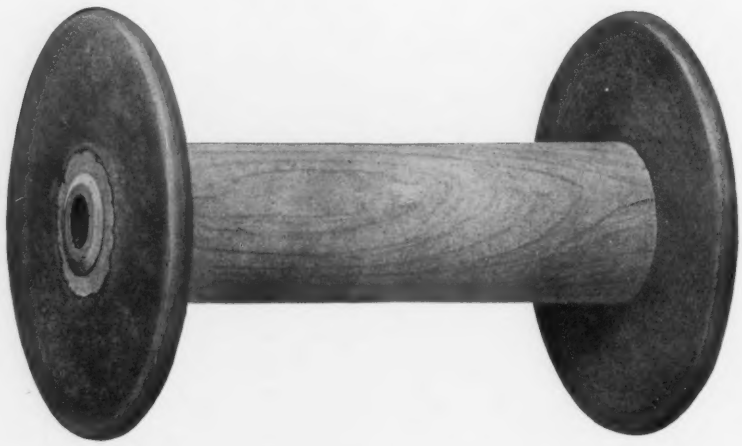

U S BOBBIN & SHUTTLE Co.

LARGEST BOBBIN and SHUTTLE MANUFACTURERS in the WORLD

Eight Factories

Providence R.I.

AN OLD TIMER SAYS

An organization of overseers goes forward mainly through each of us trying to do the very best that is in us, for our own department first, then by exerting an unselfish, honest effort to help the other departments.

* * *

Big jobs go a-begging—but big overseers and superintendents do not.

* * *

The textile industry is forever and constantly searching for men with brains, men who are trying to improve, men who are of good character. Do you qualify under this heading? If not, you'd better take stock of yourself and find out the reason why. Do you remember that "Old-Timer" article about "Know Yourself"?

* * *

Have you ever thought what a blessing your mistakes have been to you? That sounds rather foolish, doesn't it But it is a fact that we gain much valuable experience from our mistakes, especially if we remember them as we should when the same condition arises again. If everything an overseer or a superintendent attempted to do turned out to be a success—well, he would not be doing many things, because he would not have that foundation we call experience.

* * *

No idea, which was ever born in the mind of overseer or superintendent, is worth a tinker's damn unless something is done with it.

* * *

"Gosh, Old-Timer, you have been lucky," said a friend to me the other day. "How did you do it?"

"Well, I suppose, by knowing a *little* bit about mill work, then putting a *darn big* lot of hard work with it."

* * *

If my Editors should ask me what *one* thing has contributed most toward holding so many overseers and superintendents parked in one place—meaning that they do not progress—I believe I would answer them something like this: It is almost impossible for the average human being to get it out of his head that he is working for someone else—for the company. Good Lord! man, can't you realize that someone else is paying you to work for *yourself!*

* * *

How some of us do enjoy criticizing our brother overseers and superintendents! The next time you are enjoying yourself in that pastime, try to think whether you are really doing much better yourself.

* * *

A pretty good slogan to tack up in the front part of your mind where you will see it about four million times per day, is

"Beat the Other Fellow."

* * *

Recently a young overseer was offered a better job, a job with a big firm. His wife was very likely the cause of his staying on with the comparatively small mill where he had been for several years. She was reared in that neighborhood and she did not like the looks of the place where her husband's opportunity was waiting for him. If she could only know what she caused her husband to miss. But she will never know—neither will he. He will probably finish his career as a mill man never earning over $5,000 a year.

Talk about opportunity! That young man simply took a stick and knocked old Opportunity in the head and then jumped on him with both feet. Let us hope Opportunity will get over it and come back to see him some day.

* * *

But I am afraid not; certainly Opportunity will not be as big then as the one which came to him that time. He was probably too weak to see his Opportunity. One thing we do know, and that is that he certainly was not far-sighted enough to look over the fence and see what lay ahead of him ten years hence.

Such a pity!

* * *

The cop got after me the other day for parking so long in one place. As I drove off I thought of the young man I have just mentioned. He has been parked a good while right where he is. Why did he refuse to step on the gas and prove what was in him?

Maybe he has a weak tire on one wheel and hasn't the confidence that it will stand the speed. Then why in the dickens doesn't he fix that tire? So many of us have three good tires but we are letting that one weak spot hold us back.

You know balloon tires are in demand because they absorb the bumps. Well, I believe that young man needed a whole new set of balloon tires so he could have had the courage to take that job regardless of the bumps.

* * *

Some of us are still squatting right where the stork dropped us on our birthday.

Look yourself over.

Yes, I know, some of you will say: Why should I worry? I have a good parking place.

The young man referred to has a good parking place, I'll admit, but rubber tires will just simply rot, you know, standing in the garage.

(*Continued on page* 375.)

Not for the Big Alone

An adequate Accounting Service is much more of a problem to the small concern than to big business.

The necessity for right Method and System is apparent to both. The only difference is that the smaller concern feels that it can not afford to have it, while big business knows that it can *not* afford to do without it. Yet the principles of accounting are the same in each case.

Long and varied experience in serving big business, nation-wide in extent, has given the Ernst & Ernst organization special facilities in Accounting, System and Methods, which make their service applicable to all business, whatever its size.

Our service to the smaller concern is not big business service cut down to save cost. It is a special service of the highest merit, specially adapted to meet individual requirements. It is wholly adequate and easily obtainable at a cost in keeping with the size of your business.

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HOW OTHER MEN MANAGE

Practical Discussions by Cotton's Readers On all varieties of Mill Subjects

An Old Timer Says—

(*Continued from page* 373.)

But, friends of mine, there's a terrible penalty for such parking. Here's the idea: An automobile goes forward by burning up the gas; a human, an overseer, goes forward by using his energy, by using what he has above the ears (and he must do it before all the hair is gone from above the ears, too).

• • •

Stagnation, *standing* still, is the greatest curse we overseers and superintendents have hanging over us. All the history we read shows that as soon as a nation, a tribe of people or an individual begins to stand still, it then starts backward and is soon out of the running. China built a wall about herself and stood still for a thousand years; she is still standing still and is being knocked and cuffed about just like an old worn-out overseer or superintendent who has been content to stand still. Remember, brother, what "Old-Timer" has been trying to beat into your head for years: *You can get from home study what men go to college four years to get—If*—yes, a darn big IF—you have got the backbone to want it hard enough.

Sad to say, most of us are like the little boy who remarked to his Dad, "I wish I was twins." "Why?" asked Dad. "I'd make the other half cut the wood while I sit by the fire."

Yes, most of us wish we "was twins." We would make the other half study and work for advancement while we took the fat job. But that won't work. We all want to succeed but few of us are willing to pay the price in self-sacrifice and hard work.

• • •

Did you ever notice: A particularly good overseer or superintendent always seems to have a particularly good job.

• • •

It was not so very many years back when an overseer got the job because he was a good grinder, a good fixer, or a good mechanic, but the time when experience alone will get a man a job is past. No one man's experience, by itself, can keep pace with the experience of all the overseers and superintendents. This points out the wisdom of profiting by the other fellow's experiences as set down in COTTON and other magazines.

"One ship sails East and one sails West
By the self-same wind that blows.
It's the set of the sail and not the gale,
That determines the way it goes."

Have you got your sails set right, brother?

Don't worry about what people say about you. Be thankful they aren't mind-readers.—*The Arrow.*

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Figuring Moisture in Keeping Numbers.

EDITOR COTTON:

Most any mill man will agree with me when I say the question of keeping numbers has been and perhaps will be for years to come a source of much concern. Yet, I am of the opinion that there is a means of relief for us, which, if it is properly developed, will save us much worry and prevent much bad work as well as save many dollars now lost from day to day in heavy cloth, just because a man cannot tell how much moisture the cotton is taking on or throwing off in the prosesses of manufacturing.

There are many methods used by the various carders over the country in trying to keep numbers and reduce the variation in the finished product. I have followed the mill game for many years, and many have been the hours I have spent in worrying over the probable outcome of a damp day or a dry windy day. I have tried many methods of changing and regulating, from the old system of carrying a few small washers in my pocket to hang on the scales on which the finisher man weighed the lap, to that of changing the crown gear on the drawing frame and roving frame. Then for a few years I watched the weather, and would change the standard weight of my laps according to the looks of the weather. This method proved to be pretty good, but sometimes the weights would get a little farther off than I thought they should, even though I spent practically all of my time watching the weather and studying the cotton and setting the scales.

In the early part of 1923, the idea struck me that the weight of the lap could be regulated according to the relative humidity. After thinking this over for some time I decided to try it out, and consequently have developed my present system for this purpose, which has so far proven most satisfactory.

I use an American Moistening Company stand hygrometer to obtain the relative humidity in the picker room. To begin with, I set the instrument as near the center of the room as possible, at the same time being careful to see that it was not in an air current or near steam, which would affect it. Then I put a new wick on the wet bulb and fresh, clean water in the container. Now, being all set, I commenced a careful observation and recorded the relative humidity every hour of the day from seven o'clock in the

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"Just the features I want my belting to possess," you say. Of course!

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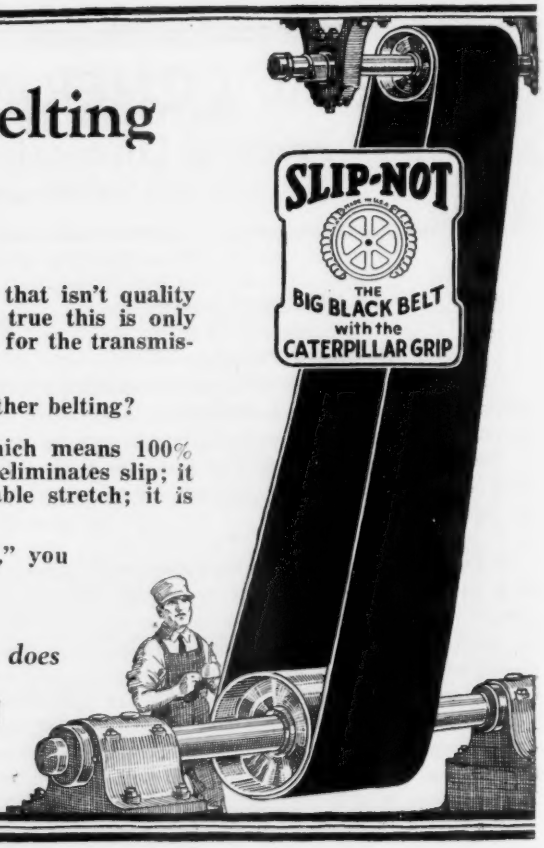

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By using the table of lap change weights shown in this article, the following report of daily averages for twenty working days, from July 2nd to August 4th, 1924, (note season of year covered) will show the application of the method, and the results secured. In this table are shown the relative humidity in the picker room, the daily average for each day, together with the corresponding lap weight, the weather condition, the average daily sizing for the finished drawing, slubber, intermediate and warp roving, and the daily sizing of the warp spinning:

Day	Relative Humidity	Wt. of Lap	Weather Condition.	Finished Drawing	Slubber Weight 12 yds.	Slubber HR.	Inter. Sizing	W. Rov'g Weight 12 yds.	Daily Siz'g Warp Spinning
1st	60.63	40.98	Cloudy all day.	55 gr.	133	.75	51.5	18 gr.	29.03
2nd	60.27	40.93	Cool, cloudy to clearing.	55.6	138	.72	51.2	17.7	28.67
3rd	71.90	41.31	Rain all week-end and still raining	56	135	.74	50.6	17.2	28.66
4th	71.18	41.60	Low clouds to heavy rains.	55.5	137	.73	49.6	17.8	29.27
5th	66.72	41.32	Distant white clouds all day.	55	137		50	17.9	28.50
6th	59.54	40.89	Light showers, 11 a.m.	55.5	136	.74	51.3	18	29.18
7th	67.45	41.45	Flying clouds to clearing to cloudy, 5 p.m.	55.5	135	.74	50	17.9	29.15
8th	58.45	40.81	Clear and hot all day.	55	134	.75	50.3	18.3	29.31
9th	59.18	40.87	Clear and windy.	55	133	.75	50	18.1	28.80
10th	57.54	40.81	Clear all day, showers at night.	55.8	134	.75	51.5	18.1	28.35
11th	52.63	40.50	Clear all day.	54.7	134	.75	50	18.3	28.50
12th	63.81	41.13	Clear a.m.; heavy storm, 3:30 p.m.	55.8	135	.74	51	18.3	29.32
13th	63.27	41.10	Partly cloudy and hot.	55.8	134	.75	50	18	29.27
14th	59.63	40.87	Cloudy, rain up the river.	54.8	133	.76	50	18.3	29.02
15th	59.45	40.36	Hot and close, to clear and light breeze.	55	134	.75	51	18	28.97
16th	64.90	41.20	Mucky dog-day weather.	55.5	136	.74	51	18	29.22
17th	61.36	41	Cloudy dog-day, no rain.	55.8	134	.75	51	18.6	29.27
18th	56.27	40.81	Cloudy to clearing, light breeze.	55	136	.74	50	18.2	29.18
19th	57.81	40.77	Clear.	55	134	.75	50	18	29.36
20th	52	40.58	Clear and hot.	54.8	135	.74	50	18	28.84

morning to six o'clock in the evening, at the same time recording the weight of my laps. This I kept up for a period of thirty working days, during which time we had several changes in the weather. An average of these figures gave me a foundation upon which to base my change table. After getting out two tables by which I ran for awhile, I found that the numbers were going a little light. The third table which I worked up is given herewith, and is the one by which my laps were run from May 22nd to September 22nd, 1924.

CHANGE TABLE FOR WEIGHT OF FINISHER PICKER LAPS ACCORDING TO RELATIVE HUMIDITY

Relative Humidity	Weight of Lap	Relative Humidity	Weight of Lap
20	39 lb. 8 oz.	64	41 lb. 2 oz.
24	39 lb. 10 oz.	66	41 lb. 4 oz.
28	39 lb. 12 oz.	68	41 lb. 6 oz.
32	39 lb. 14 oz.	70	41 lb. 8 oz.
36	40 lb.	72	41 lb. 10 oz.
40	40 lb. 2 oz.	74	41 lb. 12 oz.
44	40 lb. 4 oz.	76	41 lb. 14 oz.
48	40 lb. 6 oz.	78	42 ib.
52	40 lb. 8 oz.	80	42 lb. 4 oz.
56	40 lb. 10 oz.	82	42 lb. 8 oz.
58	40 lb. 12 oz.	84	42 lb. 12 oz.
60	40 lb. 14 oz.	86	43 lb.
62	41 lb.		

It will be noted that up to 50 degrees relative humidity we change the weight of the lap two ounces for every change of *four* degrees. From 50 degrees upward to 78 degrees we change the weight of the lap two ounces for every change of *two* degrees.

108 tests showed the following results in section beam weights (407 ends, 8 wraps), showing the number of each weight: One 393; two 395; eleven 396; eight 397; nineteen 398; twenty 399; twenty-one 400; eleven 401; eight 402; five 403; four 404; three 405; two 406; one 407. It will be noticed the lightest weight was 393, only one beam weighing this, and the heaviest was 407, only one beam weighing this also.

All of the figures given in this letter were taken from the mill records covering the period mentioned, which carders usually dread because of the many sudden changes in weather. But I must confess that it gave me little concern, last year, though I am still experimenting with it.

The scales which we use are of the Toledo swinging type. We have a three-point pointer on the face of the scales which is clamped between the frame of the scale and the rim that holds the glass. At the reading of the relative humidity, the pointer is set by loosening the screw nearest the pointer and sliding the pointer to the desired spot, then tightening the screw which clamps and holds the pointer in position. And the finisher man then weighs his laps to the pointer.

The finisher man does the reading and setting. It does not make any difference what the weather does—I don't worry my head about it. There are times when the relative humidity goes from 66 to 40 in the run of a day, which will change the weight of the lap one pound and two ounces, but the change is made hourly as the relative humidity changes.

It might be well to add that the picking and carding departments of our mill have no humidifiers. The figures given were obtained while on 1 1/16-inch western cotton, but I have since run 1-inch western and 15/16-inch local stock with as good results.

This requires patience and energy, but if a man can after a while feel that all is well with his numbers, and he is saving his company money, it is well worth the trouble.

I mentioned this system at the discussion meeting on carding, held by the Southern Textile Association in Greenwood, S. C., on December 5th. The time there would not permit of an explanation in detail, and I have tried to furnish the additional information in this letter, at the request of the Editor of COTTON.

S. G. TOUCHSTONE, COLUMBIA, S. C.

MILES WHITE, formerly at the Dover Mills, Shelby, N. C., has become general overseer of night carding and spinning at the Blacksburg Spinning Company, Blacksburg, S. C.

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The saving in bobbins is but one of many savings the Termaco has made for mills in this and foreign countries.

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Engineering Dept.

The TERRELL MACHINE CO., Inc.

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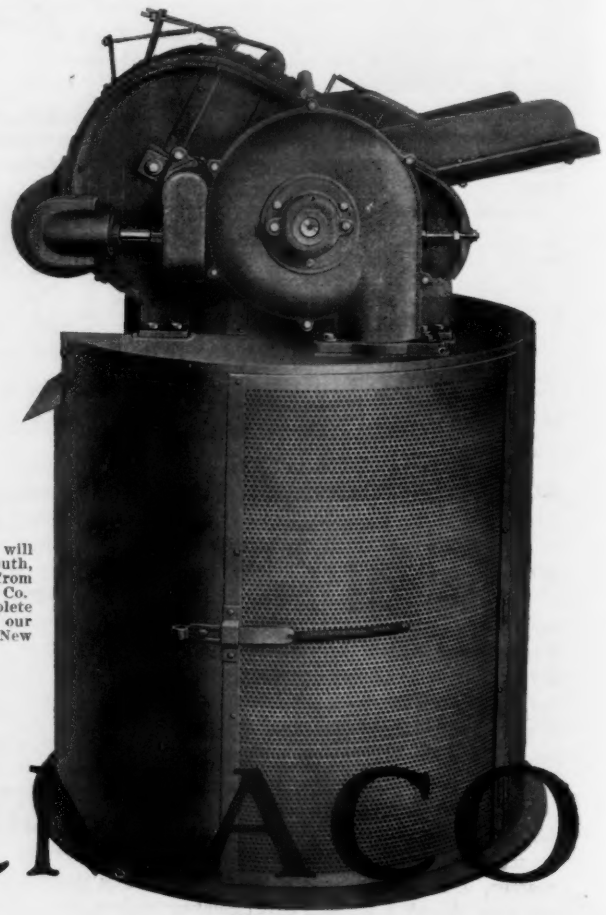
On and after February 1, 1925, we will not be represented by agents in the South, all southern business being handled from Charlotte, N. C. The General Supply Co. Danielson, Conn., which carries a complete stock of parts, will continue to act as our representatives for New York and New England.



The TERMACO

Condition Laps to Avoid Yarn Variation.

EDITOR COTTON:

I have talked at different times with superintendents who have made more or less exhaustive experiments with humidifiers in picker rooms in an attempt to condition the air sufficiently to keep the laps at the same moisture content they will attain in the card room. So far, none of these efforts has been encouragingly successful. The amount of air used by any considerable number of pickers is so great that it is almost impossible to get enough humidifiers crowded into the picker room to supply the needed moisture. Fresh air from any available source is constantly coming into the room and going out again so quickly that any attempt to accurately humidify it is difficult, if not impossible.

However, if a picker room could be supplied with conditioned air in sufficient quantities, it is certain that there would be less trouble all through the mill in keeping weights right. The actual amount of cotton of the proper humidity in a lap will vary widely during the day as moisture conditions outside the mill change. Humidity can be very accurately controlled in all parts of the mill except the picker room, and if a mill is running on a basis of a six per cent regain, it is apparent that laps run early in the morning, when the air is damp and cool, will lose weight before carding, while laps run during the heat of a summer day will gain weight in the card room. A lap that contained perhaps ten per cent moisture will lose four per cent of its weight, while a lap containing only three per cent will gain three per cent of its weight. If 50-pound laps are run, a lap weighing 50 pounds when taken off the picker with a ten per cent regain will weigh only 48 pounds at the card. The lap with three per cent regain, though weighing 50 pounds at the picker, will weigh 51½ pounds at the card. This is a total variation of seven per cent, and is not going to make things run any better.

That there are wide variations in lap weights due to different moisture contents is indisputable. In talking recently with a particularly well-informed superintendent, he said that he had found a difference of one-half of one per cent regain in laps doffed from different finishers at the same time in the same room! That is a variation of one-quarter pound in a 50-pound lap, and was due to warm air from the body of the mill affecting one picker, while cold damp air from outside affected the other.

With these thoughts in mind, I suggested to that gentleman the idea of operating a lap conditioning room, and I want to offer the same scheme here, and see if any of your readers have tried it. and if so with what results; and if not, would it not be interesting to try it and see what happens?

Since moisture conditions are kept fairly constant all through the mill except the picker room, the chief problem in keeping weights is to get uniform laps with correct moisture content. As has just been pointed out, it is not practicable to do this with any organization I have ever seen. However, I see no reason why the plan here outlined would not work to the same result:

Put all laps in a conditioning room, kept at the correct mill temperature and humidity. Leave them there until they reach the condition of the room. This might take a day, or perhaps two days, or even longer, but leave them there until they have exactly the percentage of regain desired. Then some of these will be too light and some too heavy, and this should run in a pretty well fixed proportion if the picker room is operated properly. Determine by observation about what proportion are heavy, and what light, and then set a corresponding number of cards to handle them.

Weigh all laps taken from the conditioning room, sending those of standard weight to cards set for that weight, and dividing the light and the heavy laps for the cards fixed for them. In that way it should be possible to get very even work, if the picking is in good shape.

If the pickers are in good condition, they will deliver a fairly uniform lap, with very little yard-by-yard variation, which is all that would make any difference if conditioned laps were used as suggested. If laps are not found to be fairly even from yard to yard, the pickers should be gone over carefully for defective evener motions. Sometimes the pins that transmit the movement of the piano bars will be worn and rusty, or choked with dirt. If so, the holes in the piano bars should be reamed out fresh, and new pins put in. All bearings of apron rollers, feed rolls, evener rolls, evener cone, and gearing should be clean and properly lubricated, or better still, these points should be equipped with ball bearings to minimize friction and keep out chokes that make a drag on the evener. With the evener working properly, the machine ought to turn off a good lap, so that after this lap has been conditioned, although it may have gained or lost weight, the change will be uniform all through the lap, and if it is run on a card set for that weight lap, it should make a nice, even sliver.

This idea of conditioning laps brings up another interesting matter. Dry cotton is easier to open and clean than moist cotton. Therefore, instead of trying to moisten the stock before, and during, picking, would it not be better to run it as dry as atmospheric conditions will permit and then let it regain moisture in the conditioning room. Perhaps it would be a good plan to have an intake pipe from the boiler room to the picking and opening rooms, so that dry air would largely be used in handling the cotton. This would tend to dry it out and make it clean easier and open better, and then the conditioning room would do the rest.

Possibly this has all been tried before, but I wanted to air the idea thoroughly, so that if some have tried it, they can answer the points at issue, and if any others want to try it they will have the scheme as it appears to me.

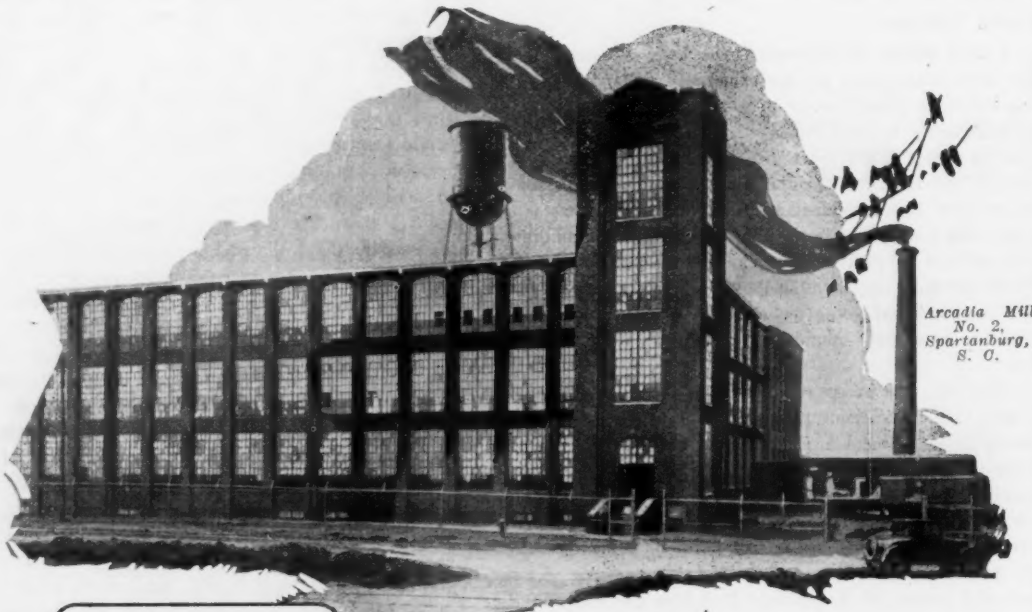
T. B. (MASS.)

Causes for Yarn Breaks at the Spoolers.

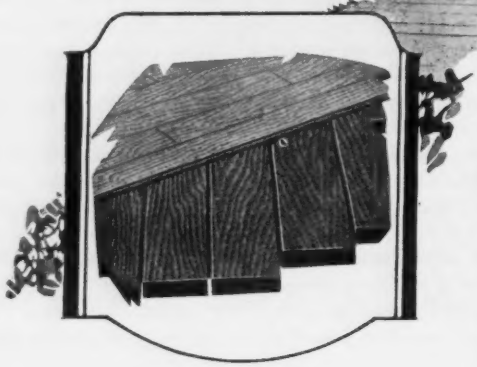
EDITOR COTTON:

I don't know whether I can help "C. and S." very much in regard to his yarn snapping at the spooling, because, as you know, conditions mean a lot in a matter of this kind. For instance, he may be using air for cleaning—as I do—and have a lot of waste break down the ends at the guides.

But surely some of his trouble must be caused by the drafts, which he gives in his letter as published in the January issue. On 14½s warp he runs a front roll speed of 115 r.p.m., with a spindle speed of 6,863 r.p.m. I think he should get at least 128 r.p.m. on the front roll as the standard is about 132. Let him make some 1.75 or 1.80 hank roving and cut his draft on spinning to about 8, and



Arcadia Mill No. 2, Spartanburg, S. C.



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get his work up to the speeder so that he can cut his draft there from 7½, which he says he is running, down to 5 or 5½. He has a large ring (2 1/16 inch) and if the barrel of the bobbin is small he makes a good big bobbin of yarn, but of course this bobbin would be heavy, and when a spooler tender put on a full one the weight might cause breaks at the weak places in the yarn.

The spooler speed of 772 for warp wind is right enough, and I think with shorter drafts he will pick up speed on his spinning.

If he is short on carding, short draft will hurt the production, but it surely will pay if it helps in the spooling by doing nothing else but reduce the number of knots.

My nearest yarn number to his is 14s. I use 1.75 roving with a front roll speed of 148 r.p.m. On some new frames we get a front roll speed of 154 r.p.m. The spindle speed on the frames with 148 r.p.m. front roll speed is 7,600—using filling wind build for warp.

I shall be interested in seeing other replies to this question, as I am interested in making 14½s with 1.53 roving and getting production, especially with the cotton we are getting this year, which has so much short staple in it.

R. C. H. (GA.)

Treatment of Aniline Black Sateens.

EDITOR COTTON:

The possibility of finishing aniline black cotton sateens so they will look like silk, without going to the expense of mercerizing, should be a subject of interest to some of your readers. A satin-like appearance on aniline black dyed cottons is frequently required, and is met in many instances by mercerizing before dyeing, followed by Schreinering. By varying the amount and composition of the filling and the particular treatment of the piece before either calendering, Schreinering or pressing, most finishers do not, usually, experience any difficulty in meeting these demands. But, in other instances, where the cost is limited to such a margin that the expense of mercerizing is altogether out of the question, some little difficulties crop up.

The distinctive, fine, soft feel and satin-like luster are a combination of qualities which, for their attainment without mercerizing, constitute at first a problem of no small importance. While these special requirements vary with regard to both feel and appearance, greater importance sometimes being attached to the former quality than to the latter, and in other instances quite the reverse, they nevertheless create not only little difficulties, but opportunities for the exercise of some judgment and experience.

As an indication—and possibly a guidance—of the procedure generally followed to produce these effects without mercerizing, an outline of recent experiences may be both interesting and valuable to your readers:

After plate singeing the pieces were given three ends through a jigger made up with a warm malt liquor (diastafor) and allowed to lie overnight in the roll. This treatment was followed by washing at full width in warm water and squeezing through a passage through a padding machine and subsequent treatment (run through) in a hot bath of caustic soda at 3 degrees Tw., then boiling under pressure for half an hour with one per cent soda solution containing an addition of a small quantity of absolute alcohol. This addition to the soda bath has a peculiar and distinguishing influence on the feel of the goods, which cannot be very easily obtained otherwise, and for that reason it is very useful for the purpose under consideration. The succeeding treatment consisted of a passage through hot water followed by cold water, squeezing, and drying on the tenter previous to dyeing aniline black. After dyeing and washing, they were dried on the cylinders, passed through a padding machine containing hot water, with the addition of a little soap, and again dried on the tenter.

Then followed the treatment on which largely depends the production of the appearance of the cloth. This is greatly influenced by the engraving of the roller of the Schreinering machine or by the regulation of the conditions of the calendering, or, again, by the conditions of the pressing. On the other hand, to meet somewhat different effects, the process may be varied by treating the pieces after shearing, and instead of soaping, with a weak bath of gelatine and glycerine—a variation giving both a better feel and a better luster. By steaming after drying, and before Schreinering, a beautiful satin-like gloss may be secured with the following finishing paste: 18 parts gum arabic, 1.5 parts glycerine, and 9 parts oxgall. The first two ingredients are boiled well together with the necessary amount of water for about half an hour, cooled, then the oxgall added, and the resulting liquid sieved carefully before use. By varying the strength of the latter solution, and with or without either Schreinering, calendering, or pressing, a multitude of effects may be obtained.

W. B. (MAINE)

Dyeing Blue Sateens with Satin Finish.

EDITOR COTTON:

Will some of your contributors please advise through "How Other Men Manage" what would be the best way to match the finish on a 30-inch border sateen of which I am enclosing sample? If possible to do so, in preparing this description, I would appreciate it if the correspondents would also include an outline of the machinery required to duplicate this finish. R. D. (WIS.)

EDITOR COTTON:

If "R. D. (Wis.)" will only read the letter on "Treatment of Aniline Black Sateens" which appears in this issue of COTTON he will find the answer to most of his question. It is true that the letter in question refers more especially to aniline blacks, while his letter refers to blues, but the finishing is practically the same, the blue being somewhat simpler. For instance:

Plate singe both sides, twice on the face, once on the back; run through diastafor in a two-box dyer and let lie overnight; wash through padder; run through caustic soda at 3 degrees Tw. into the kier and boil one-half hour under pressure in a soda solution containing a little *alcohol;* wash through hot water and then cold in a padding machine; dry on tenter; dye and wash; dry on cylinders; hot soap and dry on tenters; calender and Schreiner, etc., as given in the article on aniline blacks.

W. B. (MAINE)

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An Electric Stop Motion for Combers.

EDITOR COTTON:

It seems the comber has recently come up for discussion in COTTON, and we have read several articles regarding the setting and timing of this very important machine. But we have had little or no discussion about the care and management of a comber room; therefore this article will deal with a kink that is being successfully used and that may prove valuable to someone else.

First let me give my views regarding setting and timing. Suppose we read what some comber man says about his settings; he gives us just the number of gauge to use to obtain the best results; we take the settings to one of our combers and change it over from our previous settings. Will that comber make any better sliver than the others? I doubt it. A man's personal opinions will cause him to set a trifle loose to the gauge if he has believed in wide settings, or tighter if he believes in close settings. The feel of the gauge is different to every man, with the result that the change makes little or no perceptible difference. Timing is of course more positive, but even that can vary slightly. It is interesting to read and know how our friends are setting their combers, and apply the information, but unless a man is away off in his calculations, I do not believe in using someone else's setting.

There are conditions which arise to worry us all, and which we have to remedy, and this is the time for the man, who has read the ideas expressed in COTTON, to sift his information and perhaps apply it to his particular problem.

The most serious problem connected with combers is the damage to half laps. Once the needles become bent they can never be picked and straightened as they were before, and when they are bent the sliver will be full of tiny strings.

In the mill in question the combers run on two shifts, and the half lap damage was very excessive, the cause being tail-ends allowed to go through. This causes more damage than bad laps ever could, and when a tail-end jam does occur the half lap usually must be re-needled. If this happened on combers that were running only days it could be easily remedied, but when there are two shifts everyone knows the other fellow is letting all the tail-ends come through.

Our combers are equipped with an electric stop motion and are supposed to stop when the cans fill, which they do very satisfactorily; but they are also supposed to stop when an individual end breaks or runs out, which they do not do satisfactorily.

To overcome our difficulty we put on an additional stop motion to stop the machine before the tail-end gets to the feed roll. This is very simple and inexpensive and requires no care once it is on. We put a tin band ½ inch wide around the end of our ribbon lapper spools, and required the tender to leave this band bare when he lapped the cotton over the spool to start it up. Then we put corresponding bands around each lap roll on the comber. The outside lap roll shaft has to be insulated, at the bearings and gear, away from the machine, while the inside one is left as it is, grounded to the machine. Each band is connected to its shaft by a short wire which simply runs over the end of the wooden lap roll and is wound around the shaft. As these shafts run slowly I have had no trouble with the wires connected in this manner, although I presume a spring collar would make a more mechanical job.

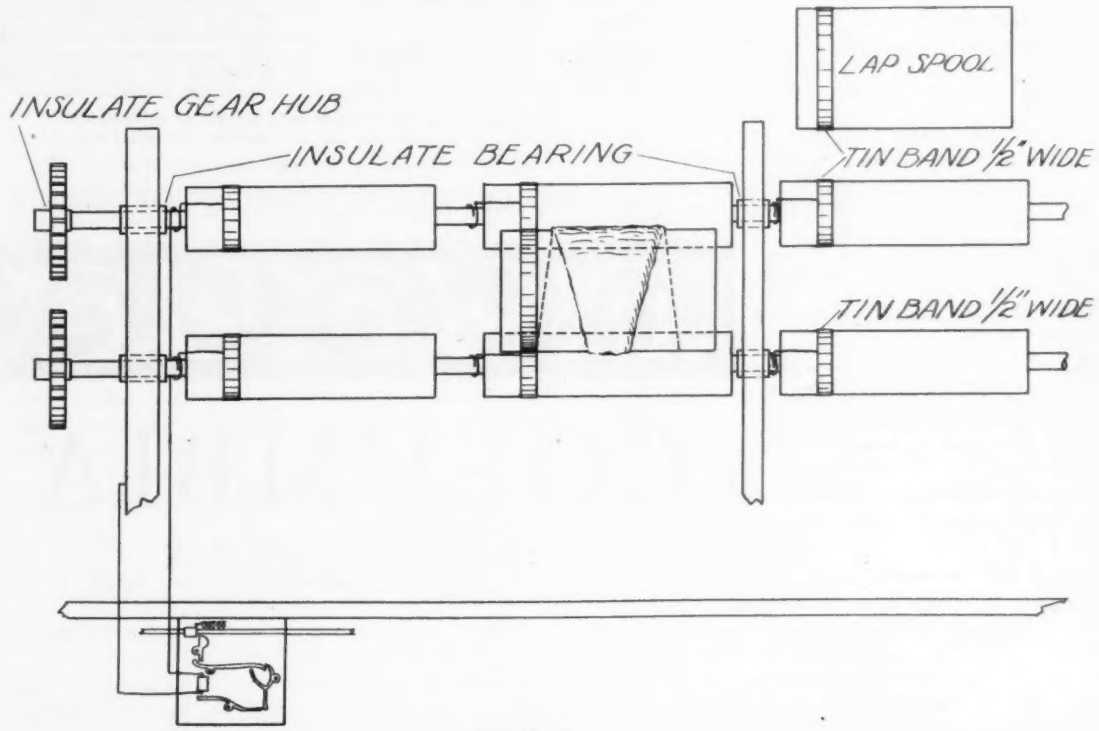

FIG. 1

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The outside shaft is connected with the negative side of the knock-off. while the other requires no connection, as it is grounded in the bearings. When the comber lap is running out, the bare band on the spool connects the two lap rolls and closes the circuit, knocking off the comber. The sketch, Fig. 1, will show the way the device works.

The sketch, Fig. 2, shows roughly the magnet box used on the regular stop motion equipment on the combers. The magnet is shown at *A*, together with its terminal wires. The negative wire is connected to the machine while the positive wire runs to the calender rolls and spoon on the coiler which are insulated from the rest of the machine. Thus when these parts come in contact the circuit is closed and the magnet draws the nearest end of the lever *B* lowering the other end and allowing the bottom of lever *C* to push toward the magnet from the force of the spring above the shipping rod. This allows the catch *E* to trip and the spring pulls the shipping rod along which moves the belt

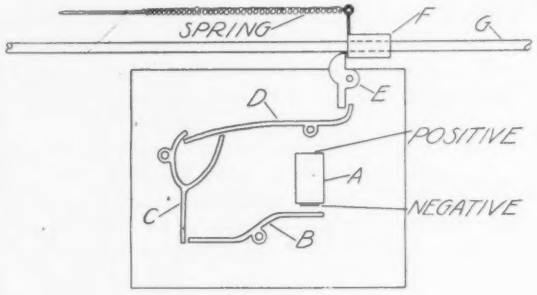

FIG. 2

to the loose pulley and stops the comber. *G* is the shipping rod. The electricity is supplied to the magnet either from the lighting system through a transformer or from a magneto operated on the comber. This is connected, one terminal to the machine and the other to the insulated parts.

The lap stop motion in Fig. 1 is an additional stopping place not customarily used, but which has been found useful. It is accomplished by using the two lap rolls as terminals, upon which the lap rests. When the cotton is run off, the tin band on the lap spool connects these two terminals, closing the circuit and stopping the machine.

With this device the laps run out so there is only about two feet of waste made, but still stop before damage can be done; a new lap can be set on the end of the old lap and a proper piecing made. Incidentally, this device will reduce waste, although this is not as important as the half lap damage.

It would be interesting to know what the half lap damage from this cause is in other mills, and how it has been reduced. M. W. H. (MASS.)

Thick and Thin Places in Roving.

EDITOR COTTON:

Responding to "G. D. S.," who reports in the December issue regarding the thick and thin places in roving, will say that I have had that same difficulty, and upon examination found I was using gears that were not of the same pitch. The result was an irregular movement of the rolls —which was invisible to the eye, although it was there— and this caused those thick and thin places in the roving. I think if he will examine the pitch of his draft and back roll gears, he doubtless will find his trouble.

As to more twist being in the thin places than in the thick places, this is due to the twist running to the thin place because it has not the resistance to the twist that the thick place has.

There may be cases where the rolls are not correctly weighted, and this also will cause thick and thin places. Most machine builders weight the rolls thus: Front, 18-pound weight; middle, 16-pound weight; back, 14-pound weight. However, experience has proven to me that these weights are not satisfactory, and for best results and even roving, I use the following: Front, 14-pound weight; middle, 16-pound weight; back, 18-pound weight. This is entirely reasonable. If the heavy weight is on the front roll it will outpull the back roll and will not draft evenly. When we made this change in weighting the rolls, we found that the breaking strength of the yarn went up 15 pounds, and we eliminated those uneven places in the roving.

With reference to the weights given, all machines do not have these weights. A variation is made for different numbers of roving, sliver, etc.

Some men will argue that a slight slip in the cone belt or a slight jump in the cones will cause thick and thin places in the roving. Their theory is the roller speed is constant and the bobbins have a different source of power and the speed varies, although the roller speed is constant and the cones have nothing to do with their speed. I fail to see wherein any thin or thick places can be caused in the roving, as anything that would cause any loss of speed to the bobbin, on the bobbin-lead fly frame, would cause the ends to kink slightly, as the speed of the cone varies due to a slight slip of the belt. Therefore, no thick or thin places can come from this.

T. A. A. (S. C.)

EDITOR COTTON:

I was interested in the question of "G. D. S." on what caused the thick places in his 7.00 and 5.30 hank roving, for that is what I am making, except that I make 5.70 and 7.00, and I judge he is making about 30s warp and 40s filling. It is an off-hand shot to answer his question as he does not state what length of staple he is using. He says his drafts are equalized as best he can get them, so we will take that for granted. However, I will give him our line-up for this work.

First, in the opening room, we have all our cotton graded, and the average grade in each mixing for the opener. (We use Middling one-inch staple.) We have a Murray cleaner through which the cotton goes before coming to our machines. In fact, our fans are beyond the Murray cleaner from the opener room, which makes a suction of it all the way. We use a tin hopper below the Murray to catch the dirt and motes falling out, and this hopper, from which about one per cent waste is secured, is cleaned twice a day.

Two processes of picking are used, with a 16-ounce breaker lap and a 10½-ounce finisher lap, 45-grain card sliver, 7 ends up on first drawing with a 6.50 draft, 7 ends up on the finisher drawing and a 6.50 draft, about 4.50 draft on slubber, being equalized on intermediates and fine frames, with about 10.85 draft on warp spinning 30s, and a break-

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ing weight averaging 58 to 61 pounds.

Some time ago we found the front metallic rolls on the drawing frames were fluted or chattered, making the drawing uneven. This we overcame by putting in new metallic front rolls. This altered the weights and tensions, but this can be adjusted. We also did considerable work on the tensions on our roving frames.

In the spinning room we have a regular system of overhauling the frames, taking care of the crooked spindles and bad bolsters along with the proper oiling of the spindles, having certain times for this. We examine and renew when necessary the top rollers on a certain number of frames per week, and, above all, enforce a system of cleaning the frames.

Another thing we found out was that we had to increase the diameter of the bands to correspond with the size of the worn whirl on the spindle which meant heavier bands. Then, we began waxing the bands when we put them on. We have the bander hold a piece of beeswax on the band while it is running to insure a good coating of wax. We found this gained about three pounds in the strength of the yarn.

Another important thing is the way the slasher is sizing the yarn but I will not go into this just now.

T. A. D. (GA.)

EDITOR COTTON:

In response to "G. D. S." on his question about thick and thin places in roving in the December issue, I will try to explain some of the possible causes from a general standpoint. The first place we will start is at the pickers. If the evener is not working right, the result will be thick and thin places in the lap; also, if the apron should slip and start in a jerky manner the same kind of lap would result. A good idea is to keep the belt on the evener about in the center of the cones so that it will have the same distance to move in both directions. In a great many mills the carder does not watch the pickers and laps closely enough, depending upon the picker tenders to keep the weight of the lap. But I don't put too much dependence on them. The second hand should keep watch of the weights, and a good rule is not to let the laps go over or under a quarter of a pound variation either way. And above all, the cone belt must not be too tight. The eveners should be kept well oiled and cleaned, and the belt should be just tight enough to run freely.

Even with good, even laps, bad work can be made at the card. We know that when a card is stripped it will run light for a number of yards before the cylinder fills up, resulting in uneven sliver, and thick and thin places. A 45-grain sliver will weigh about 40 grains per yard for a while before the cylinder fills up. The only way I know to overcome this is to let each card, after it has been stripped, run the sliver out on the floor for a few yards before piecing up into the can. Of course this will make more waste, but, on the other hand, it is much better to have this in the waste can than in the sliver. The cards should be kept in first-class condition, with good, well-ground clothing on them, set as close as possible without rubbing.

And with first-class work from the pickers and cards, the drawing frames can and will cause a whole lot of trouble if they are not watched and kept in good condition. I call a drawing frame in good condition when the following items are all right. The roll settings come first. There is no

rule by which to govern drawing roll settings, except that of experience. But let it be understood that the closer we get the front and second rolls, the better and more uniform the work will be, for in every machine these two rolls do all the drafting. Still, this can be over-done, and the resistance may become so great as to cause the top rolls to slip, resulting in trouble. It is the slight slips that give the most trouble, because they escape observation, and we may be led to believe that the rolls are seated at the best distance when 1/16th of an inch would remedy everything. This can be determined only by trial and experiment and experience. The rolls will turn with more certainty, because the pull is easier, when set farther apart, yet if they are set farther apart than the length of fiber they will pull fine places in the sliver which will be very bad for the roving. The correct principle is to keep the front and middle rolls as close as possible without crimping.

Leather-covered top rolls should be kept well varnished and in good condition.

Another cause for thick and thin places, on the drawing frame, is the practice of the drawing tender of letting a whole lot of single sliver pass on to the next process. Even though the stop-motions are all right, sometimes the drawing tenders are careless. We cannot always get the men we need on drawing frames as the wages for this work are lower, which ought not to be, because the drawing frame is the most important machine in the room—and yet they are considered a simple machine, and are neglected to a great extent, by many carders. EXPERIENCE (CONN.)

Waste Percentages on Belting Duck.

EDITOR COTTON:

I have noted the question in the January issue of COTTON with reference to waste percentages on belting duck, and also the figures given by the man asking the question.

In a mill making 6s and 7s heavy ply yarns, I think the sliver weights and roving he uses are in line, but I think his percentage of 2.91 per cent for card strips is excessive for Middling cotton; in my opinion, this should be held down to not more than 2.25 per cent.

The percentage of 1.81 per cent that he gives for duck threads also seems somewhat excessive, as 1.50 per cent would be a fair amount of waste for this item. His flyings and sweepings, also his motes, are well in line.

Doubtless this mill has lost something on humidity. A mill weaving numbers of this kind should carry a very high humidity, particularly in the weave room, and would show, under proper operating conditions, at least 2 per cent regain. In order to secure a 2 per cent regain, a relative humidity of 70 to 75 per cent should be carried in the weave room, and 60 to 65 per cent in the preparatory departments.

In reference to hard waste, this is very expensive, as it is finished product, and when wasted in the weave room it makes the loss greater as it involves labor and stock. Our hard waste here shows somewhat higher figures than your correspondent gives. We have a very complicated mill, making a big line of specialties—filter fabrics, laundry nets, etc.—and a great many of these are finished at the mill, which necessitates an accumulation of short ends and clippings. This is all figured in our waste. Our hard waste runs around 2.50 per cent.

I believe if your correspondent had on his twisters the twister attachment invented by J. S. Bachman, superintendent of the Anchor Duck Mills at Rome, Ga., which I am using, his hard waste would be reduced at least 25 per cent, as it makes a much smoother and cleaner yarn, and reduces waste at the twisters to a minimum. (This device was illustrated and described on page 955 of the July, 1924, issue of COTTON.) If the yarn is of a better quality, the weaving will run much better, and thus eliminate waste in the weave room. If this mill is operating twisters with top rolls, I believe that they do well to keep within 2 per cent on hard waste.

I trust these comments will be of interest, and shall be glad to see the opinions of others on this important topic.

S. S. (GA.)

EDITOR COTTON:

In reference to the letter of "P. B. B." concerning waste figures in heavy goods mills, on reading this I looked up our figures and found that last year our total waste at the duck mill ran on an average of 16½ per cent with about 1¾ per cent invisible loss. Our percentages of motes, card strips, filling waste, etc., ran right in line with the figures given by "P. B. B."

Our average grade of cotton for last year, however, was about equal to Low Middling. I would say, where the cotton grades average Middling that the total waste should be reduced about one per cent from the figures given.

CONTRIBUTOR NO. 897.

EDITOR COTTON:

Referring to "P. B. B.'s" letter on waste, from the figures he gives I think the waste percentage at his mill is about in line with that of an average duck mill for last year. My reason for the increased percentage is due to the cotton of last season, which was of a lower grade than that of previous years. CONTRIBUTOR NO. 898.

EDITOR COTTON:

I do not think the invisible waste shown by "P. B. B." in his letter is any more excessive than the other waste items given. I think all the figures, with possibly the exception of the filling waste and bagging and ties, are excessive. The filling waste depends largely on the number of ply filling he is running.

"P. B. B.'s" waste, on the kind of goods mentioned, running middling cotton, should not be more than 15 per cent. I have run the same goods using about average middling cotton with a waste percentage averaging less than 15 per cent, including invisible waste. My opinion, as stated, is there can be a slight scaling down in his waste made all along the line, until the total waste is not more than 15 per cent. CONTRIBUTOR NO. 899.

EDITOR COTTON:

Responding to the questions of "P. B. B." in regard to waste percentages on hose and belting duck. We are running about the same weights of yarn and making about the same product that "P. B. B." is, but use a little lower grade of cotton, our average grade being about 40 points below middling. Last year's cotton crop was of a much inferior grade than this year's crop, and I consider his 16.3 per cent gross waste about right for middling cotton. Our waste in October and November, 1924, was as follows:

Total waste, 16.63 per cent; visible waste, 15.33 per cent; invisible waste, 1.30 per cent; card strips, 2.26 per cent; threads, 2.67 per cent; flyings, 1.60 per cent; card and spinning sweeps, 1.23 per cent; motes, 2.15 per cent; and, bagging and ties, 4.32 per cent.

I shall be interested to see further information on this subject. CONTRIBUTOR NO. 900.

Overcoming Weaving Troubles.

EDITOR COTTON:

In answer to "P. T. S.," whose questions appeared in the December issue of COTTON:

First, with reference to the filling knocking off and weaving in on the small end and also on the barrel end of the bobbin, on wide looms, will say I also have this trouble, and I do not believe there is any way to stop it without the use of feeler motions, and these I am putting on.

With reference to the number of traveler to be used on 25s yarn, this cannot be answered for all mills, as it depends on the size of the bobbin, size of the ring, and speed of the spindle. The larger the bobbin, the smaller the ring, and the slower the speed of the spindle, the heavier is the traveler required. The smaller the bobbin the larger the ring, and the higher the speed of the spindle, the lighter is the traveler required.

At our mill we use 1 5/16-inch, No. 1 flange ring, with a spindle speed of 8,900 r.p.m. We use a No. 1 traveler. This would not apply to any other mill unless they used the same ring and had the same speed. The length of build on our bobbin is 7½ inches, and the stroke is 1½ inches. The size of the bobbin is as large as we can make it without rubbing the ring.

As to "P. T. S.'s" stock of 1 1/16 to 1⅛-inch cotton, if I had such good cotton as that, I don't think I would ever have any trouble.

With regard to a machine to trim selvages on a cut of cloth taken from a Draper loom, I know of no such animal, though I would like to get hold of one. I have almost been tempted to invent one. G. E. W. (GA.)

Sliver and Ribbon Lap Machine Variation.

EDITOR COTTON:

"Is there any way to eliminate variation on Whitin sliver and ribbon lap machines, and what causes the variation, or why does a yard from the full lap weigh so much heavier than a yard from the same lap when run down to near the spool?"

The foregoing question by "L. M." in a recent issue is no doubt very interesting to many practical mill men, and all have formed some opinion as to the cause, and perhaps the remedy for same, but thus far we have failed to see any tangible results, as we all have some variation, the full lap always weighing heavier on either machine.

Let us stop for a moment at the sliver lap. It is composed of twenty slivers from the cards, which will vary from two to five grains per yard. These are lapped around a wood spool and dropped down between two iron fluted drums, the friction on these drums causing the momentum. It is true the calender rolls deliver the same amount of cotton from the beginning of the lap to the finish, but the slippage is so much greater and the cotton wound is irregular until the lap gets large enough and has sufficient cushion to carry it evenly to the finish.

Of course the variation is greater on the sliver lap than on the ribbon lap owing to the unevenness of the card slivers. Aside from this the same condition prevails at the ribbon lapper. However, the variation on this machine does not show as great as on the sliver lap. The pull on the cotton at the starting of the lap, and the varying friction speed, while not perceptible to the eye, is there, and shows in the firmness which can be detected by pressing the finger against the side of the lap from the beginning to the finish.

Now the remedy for this is the problem. Various ideas have been tried out without any great success. We have worked out a measuring device and put on our sliver and ribbon lappers. This is a great saving in eliminating waste, by having the same yardage on each lap, but does not take care of the variation.

With the present lay-out of the sliver and ribbon lap machines, we do not see how the variation can be eliminated. However, we think there will be some device perfected, making some changes in these machines that will reduce these variations to some extent. Practical men as well as amateurs are giving this question thought, and this will mean results sooner or later. Often the section hand will offer suggestions to his superior that will help solve problems, and he should be encouraged by offering him assistance in working out his ideas. Many of the great achievements in the manufacturing world today were picked up by subordinates in the manufacturing army, ideas from different individuals when improved and assembled have given us some of the greatest results. H. E. M. (N. C.)

EDITOR COTTON:

In reply to "L. M. (N. C.)" I will say that his trouble is an old one and probably cannot be eliminated, although it may be rectified to a certain degree. The same thing applies to picker laps as well as sliver and ribbon laps. It is caused by the uneven friction or rather uneven pull against the friction of the lap rack. When the lap is started the spool or lap is giving a solid hard center and as soon as a few yards are wound on, the pull against the friction forces the rack to raise, but as the lap builds, the bulk of cotton has an increasing elasticity so that it will require a longer yardage to be wound on before the rack raises. It is thus very evident that the cotton will condense more per yard as the lap builds.

One way to help this condition is to build a harder lap so that the rack will be forced up a trifle sooner than would be the case with a soft lap. This must not be carried too far though or the unevenness will reappear. The perfectly built lap (I mean pertaining to hardness or softness) is a matter of experience and can only be determined by experimenting.

I am running Whitin sliver and ribbon lappers and keep the friction weight almost at the end of the lever. I have not found it necessary to add to the standard weights, but found the best build for my laps to be with the weight in this position rather than with a shorter leverage. My laps are heavy, 565 grains on the sliver and 575 on the ribbon lapper. If they were being run lighter, probably the weight would have to be adjusted for a shorter leverage.

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The ribbon lapper is more apt to give trouble with the friction than the sliver lapper, for the reason that the brake shoe on the sliver lapper is under the pulley, while the ribbon lapper has a brake running over the pulley. I found the two eyes at the end of this band have a tendency to become sprung and throw the band off the pulley to one side or the other. Of course unevenness is bound to occur with this condition which must be remedied by having the eyes lined up.

If "L. M." is making a ribbon lap that does not vary more than from 8 to 24 grains per yard, all through his lap, he is making as even a lap as possible, taking everything into consideration, unless he runs exceptionally light laps. M. W. H. (MASS.)

EDITOR COTTON:

In reply to the inquiry of "L. M. (N. C.)," regarding variations on Whitin sliver and ribbon lap machines, and his experience in finding that a yard from a full lap will weigh heavier than a yard from the same lap when run down very small and finding the different ranges from eight to twenty-four grains. I take it that these variations apply to both lap processes.

In finding a solution to the problem, many things have to be taken into consideration: Was the test a thorough one such as taking three sizings of a full and small lap on both the sliver and ribbon lap machines, morning and afternoon, and figuring the average and then finding how much the average varied from the standard weight of lap? Were "L. M.'s" figures the result of such a test? If so, in my opinion, the cause of such variation lies in the machine. But if the test that produced those figures was made on say one or two machines, the cause might lie in the cards; such as some of the slivers might have been light as a result of split picker laps or of the sliver having been fed to the card coiler too soon after stripping. Also, were any full cans put up at the back of the sliver machine during the test? All cards will vary in the weight of sliver produced as all of them do not take out the same percentage of waste.

I do not want "L. M." to think that I am saying his cards do not work properly, but I am merely pointing out some things that should be considered when a test is made on only one sliver and ribbon machine out of a section of probably five or six times that number. Another thing to consider is the make of the machines. Two of the largest manufacturers equip their machines with a different type of brake. On Whitin machines a clog or shoe brake is used on the sliver lap machine and a band brake on the ribbon machine. The Hetherington is equipped with a clog brake on both processes. The latter type of brake, in my opinion, is more effective and serviceable. Another factor is whether the lap plates are equipped with ball-bearings.

If one were to watch the conditions under which a full and small lap works when running in a machine, he would get the impression that there is good reason to believe there is bound to be a variation in the weight per yard of the two different sizes of laps. I will illustrate briefly the working conditions of the two different sizes of laps which would cause this impression. When a ribbon lap machine is starting to make a new lap, the fluted drums have a good grip on that lap through feeling the hard center (wood lap spool); the lap being small and the brake acting on the friction pulley put sufficient pressure on the pulley to bind the lap down on the fluted drums and make a neat and compact lap. That lap, when small, gives the impression that the sheet of cotton is being strained or stretched a little through being wound around the spool so tightly. As the lap gets larger the fluted drums do not have the same grip because the spool is forced farther away from the bite of the drums owing to the lap increasing in size. As the lap increases in size the distance from one point to the other, where the drums come in contact with the lap, is not sufficient to make the lap as compact as when it was small.

Also, the nature of the cotton must be considered—when the lap is about three-quarters full the outside layers appear as though they are going to be nipped in or wrinkled at the bite where the sheet of cotton is being wound on. Thus is seen the reason of the impression that the weight per yard of a full and small lap may vary. The outside layers of all laps are not as firm as the inside layers. One can tell that by feeling at the side of the lap. Yet when that full lap is running in the machine the part of the lap or cotton between the spool and fluted drums is as firm at the outside layers (near the drums) as the layers near the spool. With the lap revolving, the cotton is not under the pressure of the weight of the lap racks and brake all the time, and as soon as it feels the relief of this it opens or expands, but it is made compact again when between the spool and drums, for it is the compactness of the cotton between the spool and drums that forces the lap racks upward and causes the brake to give to the friction pulley. I do not think the lap racks are as hard to force upward once the lap spool is higher than the fluted drums.

Provided the lap machines are working all right, I do not think the lap is stretched at any point enough to produce any noticeable results even when sizing, as it would show up on the comber sliver in the pan. If the lap machines are working properly, the sizing of full and small laps should show better results than "L. M." is getting.

For the benefit of "L. M." and other readers, I am sending along in the accompanying tables, the results of a small test taken under every-day conditions with no special arrangement made for it. As a lap was made, it was taken out and sized carefully. This will serve to show that the small laps do not always show lighter than full laps.

Assuming that "L. M.'s" figures are the result of a test similar to mine, I believe the cause is in the machine, and the following are a few things that will cause trouble: The flange or plate rack sticking at the bottom of the stand slide through lack of oil. or not being set square and true, will bind the lap too much when small. All the binding or pressure needed to make a neat and compact lap should come from the brake and the fluted drums gripping the lap and these are aided by the weight of lap plates and racks. When the rack moves upward and away from the dry and tight place, the lap feels less pressure, and through its compact bulk it forces the brake to give more than it should. If the lap racks are too deep in mesh with the friction pulley shaft gear, either both racks or only one of them, it will bind the spool more than necessary. If the spool when let down on the fluted drums does not bite the full width of the drums through one rack being a trifle higher than the other, one side of the lap is tighter than the other. Lap plates that are binding through lack of oil or one lap plate being higher than another and the racks binding, will make a hard lap and sometimes burn the sides.

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If these conditions exist, they will, sooner or later, give trouble in one form or another—maybe in the form that "L. M." is having it and I hope the information will help him. If it does not, then here is a suggestion I am almost certain will benefit him:

Do not have all sliver laps in the ribbon machine run out at the same time. Only have one at a time run out. (Do the same on the comber.) Start from the driving end and put a small lap in every other head. By doing this he will stop the variations from going any farther—by mixing the heavy full lap with the small lap and stopping all excessive light and heavy work from being in one place as when creeling all the laps at once.

FULL AND SMALL RIBBON LAP SIZINGS.
Standard 615 Grains.
Full Lap Sizings

Ribbon Mach. No.	1st Sizing	2nd Sizing	3rd Sizing	Average, Grains
1	617	...	...	...
2	611	...	...	...
3	618	...	...	...
4	604	...	...	...
5	618	...	...	...
6	612	...	...	...
7	602	...	...	...
Avg.	611.5	Total		

Small Lap Sizings.

Ribbon Mach No.	1st Sizing	2nd Sizing	3rd Sizing	Average of three sizings, Grains
1	600	596	595	597
2	625	622	628	625
3	614	621	611	615.3
4	583	585	593	587
5	608	610	609	609
6	630	614	621	621.6
7	594	600	599	597.6
Avg.	607.7	606.8	608 Total Avg.	607.5

Test No. 1.

SMALL SLIVER LAP SIZINGS.
Standard 540 Grains.

Sliver Mach. No.	1st Sizing	2nd Sizing	3rd Sizing	Average, Grains
1	527	530	533	530
2	538	533	524	531.6
3	528	521	520	523
4	542	536	536	538
5	541	538	536	538.3
6	532	536	536	534.6
7	544	543	541	542.6
Avg.	535.7	533.8	532.2 Total Avg.	534

Test No. 2.

FULL AND SMALL SLIVER LAP SIZINGS.
Standard 540 Grains.
Full Lap Sizings.

Sliver Mach. No.	1st Sizing	2nd Sizing	3rd Sizing	Average, Grains
1	525	525	...	525
2	547	545	...	546
3	539	541	...	540
4	547	546	...	546.5
5	545	551	...	548
6	543	539	...	541
7	531	538	...	534.5
Avg.	539.5	540.7	... Total	540.1

Small Lap Sizings.

Sliver Mach No.	1st Sizing	2nd Sizing	3rd Sizing	Average of three sizings, Grains
1	540	539	543	540.6
2	545	537	537	539.6
3	545	546	546	545.6
4	548	552	547	549
5	521	520	521	520.6
6	549	546	560	551.6
7	528	534	529	530.3
Avg.	539.4	539.1	540.4 Total Avg.	539.6

Test No. 3.

FULL AND SMALL RIBBON LAP SIZINGS.
Standard 615.
Full Lap Sizings.

Ribbon Mach. No.	1st Sizing	2nd Sizing	3rd Sizing	Average, Grains
1	610	...	...	...
2	616	...	...	...
3	630	...	...	...
4	617	...	...	...
5	600	...	...	...
6	618	...	...	...
7	601	...	...	...
Avg.	613.7			

Small Lap Sizings.

Ribbon Mach No.	1st Sizing	2nd Sizing	3rd Sizing	Average of three sizings, Grains
1	614	616	600	610
2	620	620	611	617
3	615	635	626	625.3
4	605	605	610	606.6
5	607	620	618	615
6	618	630	628	625.3
7	609	614	610	611
Avg.	612.8	620	614.7 Total Avg.	615.9

Test No. 4.

FULL AND SMALL SLIVER LAP SIZINGS.
Standard 540 Grains.
Full Lap Sizings.

Sliver Mach. No.	1st Sizing	2nd Sizing	3rd Sizing	Average, Grains
1	532	527	530	529.6
2	525	530	535	530
3	529	523	525	525.6
4	513	519	521	517.6
5	531	521	524	525.3
6	525	529	522	525.3
7	521	526	522	523
Avg.	525.1	525	525.5 Total Avg.	525.2

Small Lap Sizing.

Sliver Mach No.	1st Sizing	2nd Sizing	3rd Sizing	Average of three sizings, Grains
1	570	575	570	571.6
2	521	528	548	532.3
3	520	521	518	519.6
4	525	528	536	529.6
5	548	544	558	550
6	550	536	533	539.6
7	550	553	544	549
Avg.	540.5	540.7	543.8 Total Avg.	541.6

Test No. 5.

FULL AND SMALL RIBBON LAP SIZINGS.
Standard 615 Grains.
Full Lap Sizings.

Ribbon Mach. No.	1st Sizing	2nd Sizing	3rd Sizing	Average, Grains
1	632	...	...	...
2	619	...	...	...
3	618	...	...	...
4	619	...	...	...
5	630	...	...	...
6	620	...	...	...
7	607	...	...	...
Avg.	620.7 grs.			

Small Lap Sizings.

Ribbon Mach No.	1st Sizing	2nd Sizing	3rd Sizing	Average of three sizings, Grains
1	610	613	...	611.5
2	623	630	...	626.5
3	635	623	...	629
4	628	620	...	624
5	607	601	...	604
6	616	616	...	616
7	602	606	...	604
Avg.	617.2	615.5	Total Avg.	616.4

Test No. 6.

I would not advise taking daily sizings on sliver lap machines, but would do all the changing on the ribbon machines. The readers will notice in the accompanying tests I have not taken three yards of sizings in every test, especially on the ribbon full lap, because I know my daily ribbon sizings average near the standard weight, and time would not permit me to take any more on some of the slivers.

Now on Test Nos. 1 and 2, the laps were run down until they were only about one inch in diameter, and the other small laps on Tests Nos. 3, 4, 5 and 6 were about one-third full at the most. So the results may show the small laps lighter per yard in some cases, but that is nothing really to worry about considering the cotton is in the bulk and a change of one tooth in the ribbon machine makes a difference of about ten grains per yard.

I hope some of the other readers of COTTON may be able to assist "L. M." and that he finds this information interesting and useful. JOCK (MASS.)

Selecting Traveler Numbers.

EDITOR COTTON:

In reply to the questions of "P. T. S." in the December issue, I would suggest that a number 6 traveler be used on 25s filling with separators, and a grade or two heavier if separators are not used. I think a number 6 would give excellent results in his case. The speed of the spindle, the quality of the cotton, etc., have much to do with determining what number of traveler should be used. The higher the speed of the spindle, the lighter the traveler.

The length of traverse to use for 25s filling should be 6½ inches to give best results. H. D. (MASS.)

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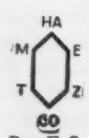

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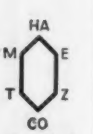

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Identifying Causes of Speeder "Smashes."

EDITOR COTTON:

In the December issue "G. S. (N. Y.)" asked for opinions on what constitute the duties of a third-hand on speeders. To the best of my knowledge, no definite rules for the duties of a third-hand have ever been laid down generally. In most mills he does not know on one day what his job will be on the next day. However, as with all other jobs wherever possible, the third-hand's duties should be definitely stated and outlined. Following are some of the things which should constitute a part of his job:

See that all machines are well oiled, and that there is no waste of oil or supplies. See that all machines are in perfect running order so far as repairs are concerned. See that the machines are cleaned regularly and at such intervals as to prevent waste from getting in the stock. Watch the finished work, such as drawing, roving, yarn and cloth, and show to the second-hand any work that does not come up to standard. He should not run to the overseer, but should go to the second-hand, as he is the proper man.

The third-hand should see that the floor is swept clean and regularly. He should be able to detect any bad work coming from a previous process which is not in his job, and report this to the proper party. He should watch for opportunities to take details and small duties off the second-hand; and in case the second-hand is away, he should look after his job.

The foregoing applies to the third-hand on the day shift. On the night shift the third-hand, so-called, has duties which do not devolve upon the man on day work. He is left alone with a few machines running throughout the long night.

In some mills, some of the duties of the night third-hand are: He must fill all duties devolving upon the day shift, with the exception of keeping the time and making out daily reports. However, in some way he must record the time if an operative goes home sick during the night. He must take up the hank reading, and double up himself or have someone do it, and leave a note of the incident on the overseer's desk. For example, "Frank Hendley was taken sick at 12:45 o'clock and went home. Jack Johnson and Henry Henderson doubled up, and ran as follows: Jack ran Frame No. 10, hank clock reading 85.6, and Henry ran Frame No. 9, hank clock reading 73.8."

Another duty of the night third-hand is to keep a correct reading of the hygrometer each hour through the night, as shown in the accompanying table. This report of hygrometer readings must be left on the overseer's desk each morning.

Time	Wet Bulb	Dry Bulb	Depression	Steam Off	Steam On
6 P. M.	71	83	12	Off	
7 P. M.	70	82	12	Off	
8 P. M.	69.5	81	11.5	Off	
9 P. M.	69	80.5	11.5	Off	
10 P. M.	68	80	12		On
11 P. M.	67.5	80.5	13		On
12 P. M.	67	81	14		On
1 A. M.	66.5	80	13.5	Off	
2 A. M.	67	79	12	Off	
3 A. M.	67.5	78.5	11	Off	
4 A. M.	68	78	10	Off	
5 A. M.	68.5	77.5	9	Off	

The third-hand on the night shift has another duty—that of keeping the operatives awake. He must watch the weights and numbers and be held to strict accountability for any variation from the average.

Now, with reference to the question, "How can the third-hand detect, from appearance, what causes a smash and how it occurs?"

If the third-hand knows his machine and is familiar with the effects of different parts being broken or out of order, he can tell what is wrong just by looking at the machine, and after some examination, should be able to determine the cause.

Suppose, for example, that the ends on the back line of a speeder came down, while the front line was all right. The third-hand should know that the set-screw in the gear driving the back line of bobbins is stripped and must be replaced with a new one—that is, if the ends kink around the nose of the flyer. However, should the ends snap off at the presser on the back line from one end of the frame to the other, something has gone wrong with the gear on the back spindle shaft. Should all the ends on the frame come down or kink around the nose of the flyers, a pin is broken in the compound or the bottom cone gear has worked loose or the cone belt is broken. This trouble can be easily located by raising the bottom cone and turning it by hand and watching to see where movement ceases.

This trouble is always in this train of gears. However, should all the ends on the frame snap off at the presser, the third-hand should know the trouble is in the train of gears driving the spindles. Sometimes, when starting up a frame, the ends, or a part of them, will snap off at the presser. Usually this is due to the first driving gear of the spindle train becoming loose and jerking. This gear is inside the headstock on the jack shaft.

Then again, we might have trouble with some of the ends snapping off at the presser. This usually is due to the poker bar not moving regularly, or waste collecting in the teeth of the taper gear and the teeth of the poker bar, causing them to "bottom" and preventing letting off. However, when this is the case, there is a ridge on the top and bottom of the bobbins, and the bobbins do not have the right "feel," but are unusually hard.

If the ends stop winding and twist like twine, it is a certainty that something is wrong with the twisting train of gears.

If the ends are all cut off at the roller, a key has given way in the draft train of gears.

However, if the ends are cut off and the rolls begin to deliver the stock again, and there is not more than one tooth gone at one place in the gear and nothing is found that would raise and throw them out of gear, usually it will be found that the gears being used in this train are not all of the same pitch, and the back and middle rollers are driven from the same train, and those gears that are of the wrong pitch will try to ride the teeth of the others. This will cause thick and thin places when the gears are new, but when they become old and worn, it will at times not only cause thick and thin places, but will cut off the end between the middle and front rolls and re-start delivering the stock. However, this may not show itself very often, although it will show in time and at different times. It will be more noticeable when the ends are running a little tight.

I guess I've said enough about that—and I hope somebody else will come across with their ideas. Now I should like to tell what I think about the systems of cleaning used in some mills. There are two that I have in mind—the

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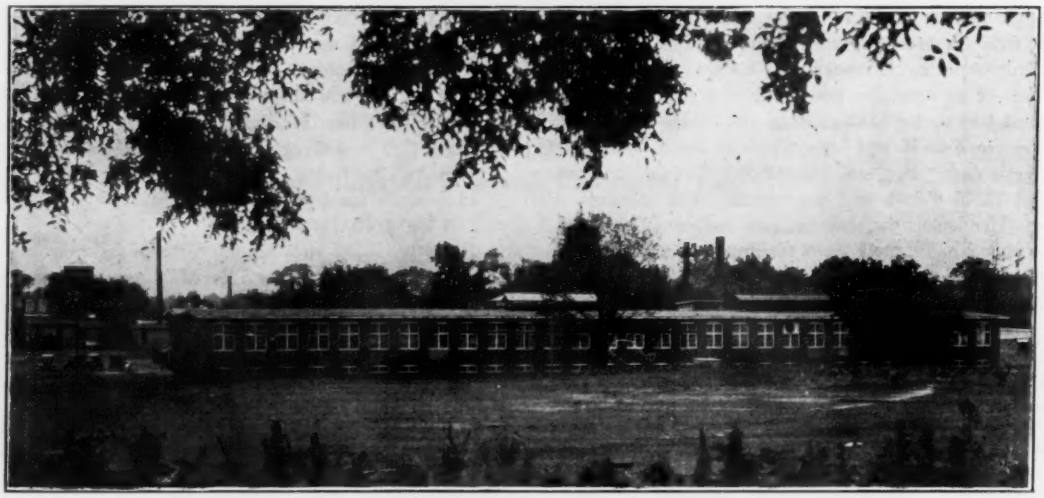

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blow-pipe system and the flap and fan-cloth system. Go down to the weave room and there you will find what are called "blow-off men," using the blow-pipe. When the section man places on a new warp, or just before, one of these "blow-off men" comes up with his blow-pipe and begins to shoot the air through this pipe into the gearing of the loom and other parts thereof, blowing black oil, waste, etc., onto the rolls on the loom and onto the rolls of cloth which have been removed and stacked on the floor. Unless these parts are cleaned with a piece of warp waste, several yards of cloth will be spotted with black oil blown into the rolls.

In the card room and spinning room, I have watched frame-hands fan off speeders, slubbers, etc., and what they would fan off of one frame would fall in the ends of the next frame, and cause lumps of waste to show up in the roving or yarn. To my way of thinking, it is best to let the attendant wipe off the machines with waste and not let any more of the loose fly get into the air than cannot be prevented. J. A. A. (S. C.)

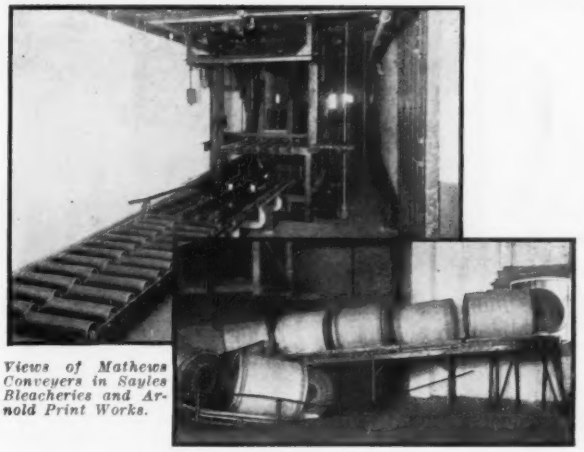
EDITOR COTTON:

In the December issue of COTTON "G. S. (N. Y.)" asks for discussion on what constitute the duties of a third hand on speeders. As his duties vary according to class of work, I shall relate a system used in a certain mill manufacturing high-grade yarns.

The speeder room in this case consists of 54 fine and 32 intermediate frames. The slubbers are taken care of by the drawing frame section-hand. On the intermediate frames there is a third hand and one on the fine frames also. Besides these two there is a man who takes care of all the leather rolls on the speeders and keeps the shafting and pullys clean. In his spare time he helps the third hand on the fine frames. An oiler takes care of all oiling throughout the speeders and a bobbin boy takes care of all bobbins; three roving hoisters are used.

Now that I have given the lay-out I will outline the duties of the third hand. He must repair all break-downs, and change the frames as the second hand orders, also carry out all orders given to him from the second hand or overseer. He must see that the doffers and tenders do their work correctly, such as cleaning flyers, clearers, marking roving, keeping the frames clean and making good work. He must also look over the creels several times daily in cases where several different qualities of yarn are being run, so as to avoid any mixed work. He is held responsible for the general cleanliness of the room and for the amount of waste made by the frame operatives. He also should notify the second hand if any quality of cotton is getting low in stock so as the frames can be changed to prevent loss of time from stopping for material. He should try to run his section at the lowest possible cost, thereby benefiting himself and the concern by which he is employed. I firmly believe that a third hand's job is a very responsible one.

"G. S." next asks how can the causes of a smash be detected. There are several kinds of smashes. First there is a case where the back or front row of ends all come down. This is caused sometimes by a coupling in the line shaft of gearing coming loose, causing either the bobbin or the spindle to cease revolving. Another case is where the ends run over on a frame. It may be a few ends or the whole frame. There are several causes for this, namely,



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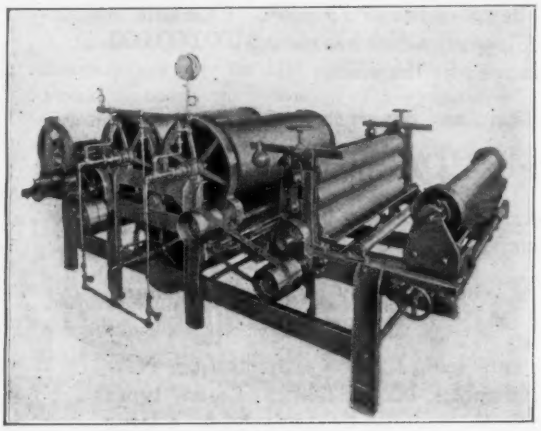
the builder motion and the twin gears. This occurs in the case of the English builder motion by the poker bar getting stuck and causing the frame to hesitate on the change, also by some obstruction getting under the weights and not allowing them to drop at the change. If the twin gears are too shallow they may skip a few teeth on the change with the results mentioned, or if they are fast on the sliding shaft. If too deeply in mesh, they both will be in mesh with the bevel gear at the same time with the results as outlined.

E. M. B. (MASS.)

Sizing Artificial Silk.

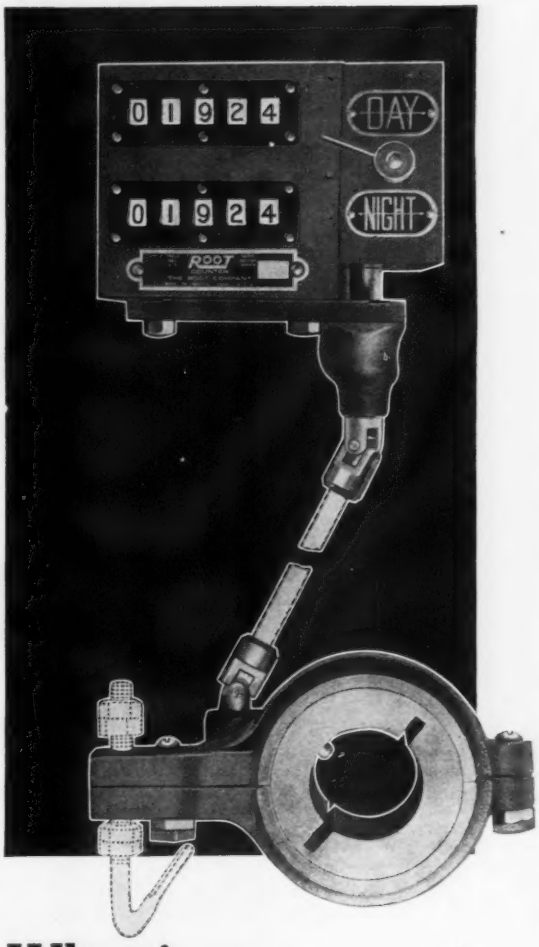
The introduction of artificial silk as a component of textile fabrics has produced new difficulties in weaving and in sizing the warps. Much of the trouble has resulted from improper sizing. Artificial silk has a certain amount of elasticity which must be retained during sizing to prevent breakages in weaving. If the sizing is baked, the silk becomes brittle with a tendency to break in the loom. Another fertile source of worry, it is pointed out, has been uneven tension due to the warp being pulled through the drying cylinders by the take-up beam with the speed increasing as the roll was built up; it is further explained that a perfect product is impossible unless the application of size and drying is effected at a constant speed.

Charles B. Johnson, 10 Ramapo Avenue, Paterson, N. J., has developed a new sizing machine, with a design for eliminating these difficulties in sizing artificial silk. A view of the machine is shown in the accompanying illustration. To obviate one of the troubles mentioned, the warp take-up beam is of the type used on modern warpers, and can be synchronized with the drying cylinders, which



are gear driven at a constant speed, insuring an even tension on the warp between the take-up beam and the drying cylinder, it is explained, consequently eliminating excessive tension and re-beaming. By a simple device, operated while the machine is in motion, the beaming tension can be adjusted as the roll increases in diameter, excessive tension being prevented by an automatic action which does not allow the tension to exceed the limit set by the operative. The warp is delivered at the bottom of the beam so that the warp paper can be slipped in from the top, it is pointed out.

The drying cylinders are of larger diameter than the small cylinders commonly used, it is stated, being 23 inches



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in diameter. They are made of tinned copper and tested at 60 pounds hydraulic pressure. The explanation of the larger diameter is that where the silk is in contact with the drying surface for a sufficient period, pressures of from five to ten pounds may be used to secure uniform drying at a temperature low enough to preclude baking of the size. The course of the threads is such that both sides are presented to the heated surfaces. These cylinders, being driven by gears, as stated, draw the warp from the let-off beam and deliver it to the take-up at a uniform speed. The tension can be regulated by the operative without stopping the machine.

Another feature described as distinctive is the type of drive used for the quetsch rolls. The quetsch is of the three-roll balancing type, the amount of size applied being controlled to suit warps of different weights. It is actuated by a variable-speed drive connected with the drying cylinders, in order that the proper relative speed may be maintained between the cylinders and quetsch.

The warp let-off, it is stated, will take beams of all sizes commonly used, and can be adjusted for alignment while the machine is in motion. Furthermore, the let-off has been lowered in this new machine, for facilitating the placing of the loom beam.

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The story of the Franklin Process Company, from its inception in a small experimental dyehouse to its present proportions, which include four large plants, is interestingly told in an attractive booklet recently issued by the company, which describes the features of this comparatively new textile process. Careful thought in preparation and arrangement is evident in the appearance of the book and its contents. It contains 44 pages of effectively presented material.

In the book it is explained that the original idea of the company was only to build machines for performing the Franklin process, but as a result of a reputation established in making sample dyeings, they found themselves in the commission dyeing business. Thus the company has two distinct phases of activity: a commission or job dyeing service for the coloring of cotton, worsted, jute, hemp and linen yarns, and the manufacture of machines for dyeing yarn, tops and raw stock. No attempt is made to describe in the book the machinery in question, the volume being devoted to the presentation of informative matter regarding the process, its function, manner of operation, and possibilities in the various types of textile manufacturing plants. It is stated the book is printed in limited edition, and is intended for mill executives only.

Crompton & Knowles Loom Works have disposed of their bobbin stripper business to The Terrell Machine Company, Charlotte, N. C.

The Terrell Macrine Company are well and favorably known as builders of bobbin stripping machines for cleaning both filling and roving bobbins.

By the addition of the line of bobbin strippers formerly built by Crompton & Knowles Loom Works, they will now be in a position to take care of an even large number of cotton and worsted mills requiring bobbin cleaning machines.

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Write for descriptive booklet CM.

British Railway Opens Offices in America.

Shippers to Great Britain who, until now, have been put to great loss of time in obtaining through freight rates from America to destinations in the interior of Britain, will welcome the announcement of the opening by the London, Midland and Scottish Railways of offices in the United States and Canada for the immediate dissemination of such information.

Heretofore shippers have been forced to content themselves with rates from America to one of the British seaboard ports. For the cost of shipping merchandise to interior destinations, cabling or writing—with the attendent loss of time or money—has been necessary. Now they can obtain accurately and immediately the cost of delivery direct to their customer's door.

Closely following the expressed hopes of the British Premier, Stanley Baldwin, for closer trade relations between the two nations, this is looked upon as a great step forward in that direction.

The United States office of the L. M. S. already has been opened at No. 1 Broadway, New York City. An office in Canada will be established in the near future. Both will be in charge of Thomas A. Moffet, one of the company's freight traffic officers who recently arrived from England. These offices will be equipped with complete information as to port dues, transfer and storage charges and inland freight conveyance rates from all of the important seaports of Great Britain to the interior.

Mr. Moffet is thoroughly acquainted with the shipping needs of this country, having traveled extensively on this side of the Atlantic. He has evolved a carefully worked-out plan for reducing overheads on storage and distribution of merchandise in Great Britain which should appeal strongly to American firms trading in that country.

The London, Midland and Scottish Railway—born of the recent railroad mergers in Britain—is one of the largest railroads in the world, operating over 20,000 track miles and backed by an issued capital of £398,000,000 sterling. It practically covers Great Britain, handles 175,000,000 tons of freight annually and has direct access from all of the great ports on the British seaboard to every part of England, Scotland, Wales and industrial Ireland.

J. O. SPAKE recently resigned as superintendent of the Easley Cotton Mill No. 3, Liberty, S. C. A. J. Mitchell, formerly overseer of weaving at the Woodside Cotton Mills Co., Greenville, S. C., was appointed to succeed Mr. Spake. F. B. Christopher has been promoted from second hand to overseer of weaving at the Woodside mill succeeding Mr. Mitchell. A. F. Hedgepeth has been changed from overseer of carding at the Woodside mill to superintendent of the Easley Mill No. 2, Liberty, S. C. J. F. Cooper succeeds Mr. Hedgepeth as overseer of carding at the Woodside Mill. He was formerly overseer of carding at Easley Mill No. 1, Easley, S. C., where he is succeeded by Henry Kirby, who was promoted from second hand in carding at Greenville.

Norma Hoffman Bearings Corporation announce the removal of their factory and general offices to their new plant at Stamford, Conn., which will be their address in the future. Their Long Island City plant has been discontinued. They are manufacturers of ball, roller and thrust bearings.

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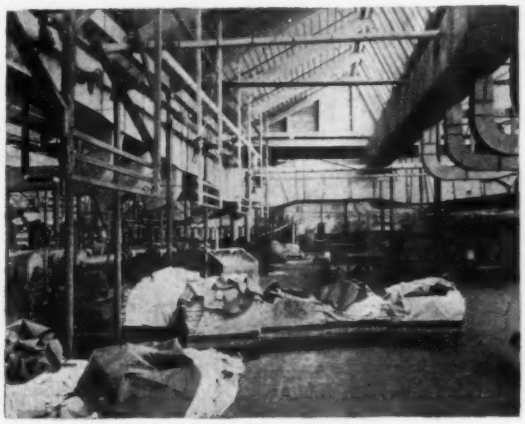
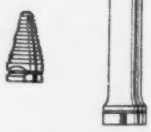


Interior of bleachery where "Buffalo" apparatus regulates the temperature. Note the piping.



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The Mechanics and Practical Operation of the Perham and Davis Evener.

BY S. A. FORD.

(The following article appeared originally in the October, 1921, issue of COTTON. Because of numerous requests for copies of it since its publication, and inasmuch as the available supply of these copies is exhausted, we feel justified in the reproduction of the article at this time. The article is pertinent to the present discussion on this subject in the "How Other Men Manage" department, and in the various association discussion meetings.—The Editor.)

The recent discussion that has been carried on in COTTON over the picker question by the readers and the carding committee of the Southern Textile Association has brought to light many interesting points. The writer agrees with some and disagrees with others.

The object of the picking process is the production of a lap which shall be even in all respects both as to weight per unit of running length and per unit of width; shall be well cleaned of all foreign matter, that is, shall contain the least possible amount of such trash; and shall be made up of stock which has been well opened and aired and have the same density per unit of area. These are the qualities desired in a lap, always remembering that in attaining the desired object, we shall treat the cotton in such a way that we will damage the fiber the least possible.

The process is what may be called purely mechanical. It may be divided into three separate and distinct operations; namely—feeding, cleaning, and lap forming. It is a process in which the finished product has the same form as the stock with which the machine is fed. But unlike other machines in the cotton manufacturing process whose product has the same form as the stock with which they are fed, (such as drawing and roving frames) the identity of the lap is completely lost during its passage through the picker and it becomes necessary to reform the stock into a lap. This point should never be lost sight of as it plays a prominent part in the discussion to follow.

The treatment of the stock during the breaking up of the tufts, the removal of sand, seed and leaf dirt and the amount of beating the stock receives are all controlled by the speed and type of beater, the setting of the beater and the setting and type of grid bars used, together with the force of the air current.

The formation of the lap is accomplished by that part of the machine known as the lap forming mechanism, consisting of the screens, calender and lap rolls. The formation of the lap on the screens is brought about wholly by the action of air currents. The construction of the machine is such that the surface of the top screen exposed to receive the cotton is much greater than the surface of the bottom screen so that fully 75 per cent of the cotton is drawn onto the top screen. It is at this point where the stock is reformed into a lap, where much damage may be done to what might otherwise be called a perfect lap. For no matter how perfect the laps fed may be, no matter how perfectly the evener and feeding mechanism may be working, unless the lap forming mechanism is working properly you cannot produce even laps. The secret of this is in remembering that the air current should draw the stock onto the screens and not allow the beater to throw it onto the screens.

The beater itself creates a certain air current which has a tendency to neutralize the air current generated by the fan. This must be overcome by the current of air from the fan.

The control of the fan current is accomplished by means of dampers placed in the air flues leading to the fan from the ends of the screens. It should be such that the stock should be evenly distributed over the screens and that all the stock should be drawn to the surface of the screens. By this I mean that none of the stock should be allowed to go down into the "bight" of the screens unless carried there on the surface of the screens. This will tend to reduce the chances of bunches or thick spots in the lap. If the amount of air leaving the screens is greater at one side than the other, then the lap will be heavier at that side because more air will carry more stock. If laps of such characteristic are made on the breaker they will have the same general characteristic from the finisher. While the lap forming mechanism of the intermediate and finisher will tend to remove this characteristic somewhat, they cannot entirely eradicate the defect and they receive no help from the evener for the evener tends to even only in regard to the weight per lineal yard.

The evener motion serves a very useful purpose but it has its limits and must be treated properly. Just because it is an evener it cannot be fed with any old kind of a lap and then be expected to produce even work in the fullest sense of the word.

The start of even yarn should begin back in the mixing room. The feeding of stock on the picking process is governed by the *density* of the stock, from the breaker picker with its automatic feeder, through the finisher with its evener motion.

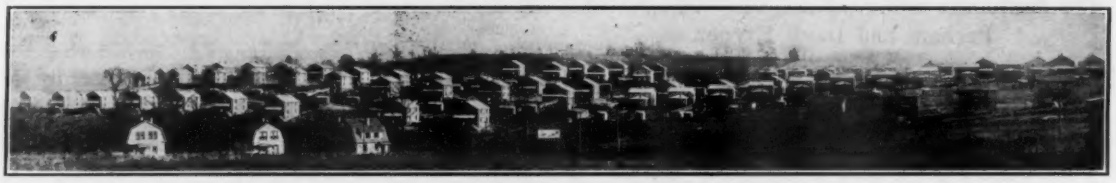
By density I mean what might be called the weight of stock per cubic inch. By the term more dense I mean more weight per cubic inch or the same volume would weigh more.

The knocker off, on the automatic feeder attached to the breaker, removes surplus stock carried up by the elevating apron. It is set a certain distance from the elevating apron and will feed less weight per unit of time on light fluffy stock than would be the case if the stock was more dense.

The action of the evener motion is governed by the density of the stock fed to it. That is, the plates in the evener box are actuated by the bulk of the stock passing under them. If the stock runs uneven as regards density then the action of the evener plates will be uneven. It, therefore, follows that in the production of even yarns we must start at the mixing pile and so mix and open the stock that our final mixing shall be of the same density throughout.

It is with the feeding of the stock that the writer wishes to particularly deal. This part of the picker consists of the lap apron, the evener motion and the feed rolls. All of the feeding mechanism is driven from the cone on the evener motion. It is here that the writer has found his greatest trouble in overcoming uneven laps.

The causes of such unevenness might be listed as follows: slack cone belt, feed rolls or lap apron binding from being out of line, lack of oil or lap apron too tight, lap



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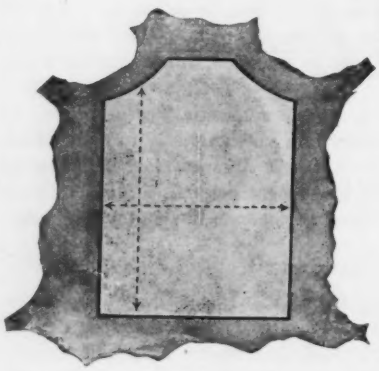

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apron too loose causing a slippage when a full lap is dropped onto the apron, feed rolls licking up causing sucking in, and an improper setting of the evener motion.

The evener motion was designed in such a way theoretically, that it should feed the same bulk or weight of stock per unit of time. If the laps fed the evener motion were always the same weight per running yard and always the same density, then, with the evener properly set the cone belt should never move from its position except as a lap runs out and its purpose would be only for that one reason as one writer recently suggested. But if this was the case it would only be necessary to have one evener plate extending the width of the evener box. This would necessitate only one pin connecting with the top lever and would do away with the system of compound levers now in use.

The designers, however, having due regard for the great chances of many holes, bunches, etc., which sometimes occur in the best regulated of pickers, conceived the idea of using many narrow plates (to be exact 16) which would be operated independently of each other and which would tend to overcome irregularities of small area. These sixteen plates were then connected by a series of compound levers to the major lever over the evener box and which governs the movement of the cone belt along the cones. Their theory was, in this manner, to speed up or slow down the feed rolls according as the stock entering was light or heavy. The more plates that drop the greater the effect would be on the major lever causing a greater movement of the cone belt. If one lap should run out, then all the plates would drop and the movement of the cone belt would be twice as much as if only eight plates had dropped. And with a fewer number of plates operating the result would be smaller in proportion.

But the effect of the evener motion is felt only in the length of the lap, not in its width, for if there be a heavy spot on one side of the lap fed and a light spot on the other side, as much lighter than the standard as the heavy spot is heavier, and both equal in area, then one will raise the same number of plates as much as the other will drop them. Then the heavy place will neutralize the light place and while the plates will drop and rise there will be no movement of the cone belt.

Such irregularities as this must be taken care of by the lap-forming mechanism, which, through the action of the air current, tends to distribute the stock evenly over the surface of the screens. The stock on the screens forms a blanket tending to interfere with the entrance of the air current and as the air will seek that course offering the least resistance, and will be stronger where the stock is the lightest, it will have a tendency to overcome such inequalities.

Theoretically, with the draft and evener motion properly set to produce certain weight laps it has always been considered that we might feed lighter laps and still get our standard weight. But this could not be done continuously and get the most even work possible. The evener would overcome such a difference provided it came at intervals so that the cone belt could regain its standard position. This is due to the fact that with conditions standard the cone belt should have a standard position and the major lever should have a standard adjustment, but if the position of the cone belt should change its standard position, due to lighter laps being fed continuously, then the adjustment of the fulcrum of the major lever should be changed to compensate for the change of standard cone belt position. The mathematics of this will be shown later.

With a perfectly operating lap-forming mechanism and the feeding mechanism working mechanically perfect, the evening properties of the cotton picker are obtained from two sources; namely, the doubling of the laps on the feed apron and through the action of the evener motion. Provided the laps on the feed apron are perfect there will be no work for the evener to perform, if four laps are always passing under the evener plates, and the cone belt will not move from its standard position.

But it is, of course, impossible, in the general run of conditions, to be sure that our breaker or intermediate laps will be perfect, so it is safe to say that the evening properties are derived from the two sources as named above.

To determine just how much evening comes from the doubling and how much through the action of the evener, the writer made some experiments, the results of which are shown in the following tables.

The stock was Strict Middling uplands of 1⅛ inch staple which had been thoroughly opened and mixed. The standard weight of the breaker laps was 13 oz. per running yard; that of the intermediate and finisher picker were 10 oz. per running yard respectively. The standard position of the cone belt was on a 4-inch cone diameter and the draft gears figured accordingly. One yard lengths of lap were weighed.

Table 1 shows the individual weights of one yard lengths from breaker, intermediate, and finisher with the cone belt held constantly on the 4-inch cone diameter which gives the evening properties of doubling only. In plugging the evener, care was taken to see that the adjusting screw on the major lever was backed off to allow the evener plates free play.

TABLE 1.

Without using evener motion.

Standard, 13 Oz. Breaker.	Standard, 10 Oz. Intermediate	Standard, 10 Oz. Finisher.
12¼ oz.	9½	10½ oz.
12½ oz.	10¼ oz.	10½ oz.
12½ oz.	10¼ oz.	10¾ oz.
12¼ oz.	9½ oz.	10¾ oz.
12½ oz.	10 oz.	10¾ oz.
12½ oz.	10 oz.	10¾ oz.
12¾ oz.	9¾ oz.	10¼ oz.
12¾ oz.	9¾ oz.	10¼ oz.
12¾ oz.	9¾ oz.	10¼ oz.
12¾ oz.	9¾ oz.	10¼ oz.
14 oz.	10½ oz.	10 oz.
16 oz.	10½ oz.	10 oz.
13¾ oz.	10⅜ oz.	10 oz.
13⅜ oz.	10 oz.	10 oz.
12½ oz.	10⅜ oz.	10¼ oz.
13 oz.	10 oz.	10¼ oz.
13 oz.	9¾ oz.	10½ oz.
14½ oz.	9¾ oz.	10½ oz.
14½ oz.	10¼ oz.	10½ oz.
14 oz.	10¼ oz.	10½ oz.
14 oz.	10¼ oz.	10 oz.
14 oz.	10¼ oz.	10¼ oz.
12 oz.	9¾ oz.	10¼ oz.
13½ oz.	9¾ oz.	10 oz.
Total = 318 oz.	Total = 241 oz.	Total = 248 oz.
Average = 13¼ oz.	Average = 10.04 oz.	Average = 10.33 oz.
Heaviest = 16 oz.	Heaviest = 10.75 oz.	Heaviest = 10.75 oz.
Lightest = 12 oz.	Lightest = 9.50 oz.	Lightest = 10.00 oz.
% Variation = 30.1 %	% Variation = 12.4%	% Variation = 7.2%

These tests showed that with pickers operating as perfectly as possible, without the use of an evener on the intermediate and finisher, a finisher lap was made which showed a variation of 7.2 per cent in the weight of one yard lengths.

When tests were made using the evener motion the cone belt was run on a 4-inch diameter and the laps fed the intermediate were the same as those used in the first test

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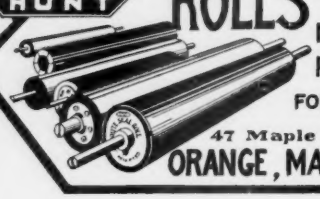

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so that in each case the laps from the breaker varied 30.1 per cent.

TABLE 2.

Using evener motion.

Standard, 10 Oz. Intermediate.	Standard, 10 Oz. Finisher.
9¾ oz.	10¼ oz.
9⅞ oz.	10⅛ oz.
10¼ oz.	10¼ oz.
10¼ oz.	10⅛ oz.
10¼ oz.	10⅛ oz.
10¼ oz.	10⅛ oz.
9⅞ oz.	10⅛ oz.
9⅞ oz.	10⅛ oz.
10 oz.	10⅛ oz.
9⅞ oz.	10⅛ oz.
9⅞ oz.	10⅛ oz.
10 oz.	10⅛ oz.
9⅞ oz.	10⅛ oz.
9⅞ oz.	10⅛ oz.
10 oz.	10¼ oz.
10 oz.	10¼ oz.
10 oz.	10⅛ oz.
10 oz.	10⅛ oz.
9⅛ oz.	10¼ oz.
9⅛ oz.	10¼ oz.
9¾ oz.	10¼ oz.
9¾ oz.	10¼ oz.
9¾ oz.	10⅛ oz.
9¾ oz.	10⅛ oz.
Total = 237.0 oz.	Total = 250.0 oz.
Average = 9.875 oz.	Average = 10.41 oz.
Heaviest = 10.25 oz.	Heaviest = 10.50 oz.
Lightest = 9.50 oz.	Lightest = 10.25 oz.
% Variation = 7.6%	% Variation = 2.4%

The results of the test where the evener was used showed that the finisher lap had a variation of only 2.4 per cent where a variation of 7.2 per cent was found when the evener was not used.

This would seem to indicate that the evener motion does serve some useful purpose at times other than when a lap runs out.

The sketch shows a diagram of the Perham and Davis evener as applied to a Kitson picker.

The feed and evener box rolls are driven from the cone at a speed which is governed by the speed of the cone which in turn is governed by the position of the cone belt on the cones. Through the cone belt rack, the quadrant and connecting lever D the position of the cone belt is controlled by the major lever which in turn is raised or lowered by the plates in the evener box acting through the series of compound levers.

The evener plates are operated by the mass or density of the stock passing under them and through the levers and gears acting as levers, they cause the cone belt to be moved along the cone, thereby increasing or decreasing the speed of the feed rolls to compensate for a light or heavy feed.

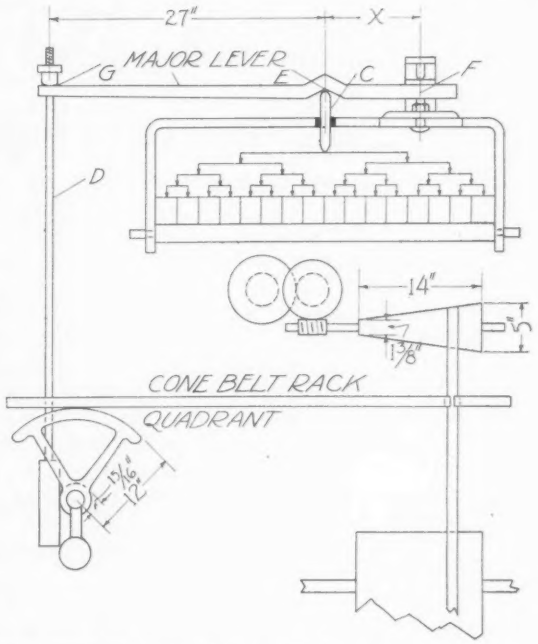
Thus the action of the evener causes an alteration of the draft according to the weight fed. It, therefore, follows that with present machinery and conditions it would be impossible to have a constantly driven feed roll whose speed would never change.

The distance the cone belt moves along the cone is controlled by two things—namely the rise or fall of the evener plates and the position of the fulcrum F. The greater the rise or fall of the evener plates the longer the movement of the cone belt. The greater the distance X, or the distance from E to F, the less the movement of the cone belt.

With the same weight laps fed under the evener plates there will always be the same drop of the connecting pin C. when one lap runs out. This will cause the major lever to drop the same amount at the point E. The drop at the point G, however, is the thing which determines the amount the cone belt shall move and this is controlled by the distance from E to F as well as the drop at the point E. So it is possible to have the point E drop a certain amount and then have G drop more or less according as the distance X is less or more. The closer F is to E the more the point G will drop with the same drop at E.

The proper setting of F is at such a point, that, when C drops, owing to one lap running out, the point G will drop an amount sufficient to cause the cone belt to be moved to such diameter as will feed the three laps remaining at a rate high enough to compensate for the loss of the lap which ran out.

But first it must be determined what shall be the standard position of the cone belt. Most every overseer has his own idea where the cone belt shall run when feeding the full quota of laps. Some prefer running the cone belt on the middle of the cone and some prefer running it on a four-inch diameter and others have a different idea as to where its standard position should be. But there is one thing that all will agree on and that is, *it must not slip*. This



point must be looked after and it is most certain that the larger the diameter the cone belt runs on, the less is the liability of its slipping. A four-inch cone diameter is about the limit, however, and the writer feels that best results are obtained at this point.

But if the cone belt is not slipping, it really does not make much difference where it is run within limits, provided the fulcrum F is properly set. But if the cone belt is run on a three-inch diameter, F should be set differently than when the cone belt is run on a four-inch diameter.

For example: The cone driving the feed rolls is 14 inches long. Its small diameter is 1⅜ inches and its large diameter is 5 inches. This being a straight-faced cone, it increases in diameter the same amount for each inch in length. Then 5 in. — 1.375 in. = 3.625 in. = total increase in cone diameter. This increase of cone diameter takes place in the length of the cone, or 14 inches. Then the increase in diameter for each inch of length must be 1/14 × 3.625 = .25875 inches. This means that any two points one inch apart on the cone will show a difference in diameter of .25875 inches.

Let us suppose the cone belt to be running on a 4-inch diameter with four laps feeding. When one lap runs out only three are feeding and the rate of feed for three must be four-thirds as fast as the rate of feed for four to keep the same amount feeding at all times. This would call for the cone belt to be moved to a position with a diameter three-quarters as large as the original because the cone being driven it would call for a reduction in diameter to increase its speed. Then the diameter on which the cone belt should run when only three laps are fed should be three-quarters of 4 or 3 inches. This means the cone belt should move a distance sufficient to cause a reduction of one inch in cone diameter. As the cone diameter reduces .25875 inches for each inch in length, the cone belt movement must be an amount equal to 1 divided by .25875 inches.

$$1 \div .25875 = 3.86 \text{ inches.}$$

That is, the cone belt must move a distance of 3.86 inches horizontally to cause it to move from a 4-inch to a three-inch diameter.

Now in making the tests shown in Tables 1 and 2 the writer further tested the density of the 13.25 oz. breaker lap by running each of the four laps fed one at a time under the evener plates and measuring the rise of the pin C.

Each of the four laps fed raised the pin C 1/16 inch and when one lap was taken out the pin C dropped 1/16 inch. So for a 13¼ oz. lap the pin C was raised 1/16 inch for each lap added and dropped 1/16 inch when one lap ran out. We have seen that the cone belt must travel 3.86 inches when one lap runs out and that the point E on the major lever drops 1/16 inch when one lap runs out. So the distance E to F, or X, must be such that with 1/16-inch drop at E, G will drop enough to allow the cone belt to move 3.86 inches toward the small end of the cone.

The quadrant meshing with the cone belt rack has a pitch line radius of 12 inches which has the same effect as a lever 12 inches long. The small pinion gear carried on the hub of the quadrant and meshing into the rack on the rod D has a pitch line radius of 15/16 inch, which has the same effect as a lever 15/16 inch long.

With the quadrant on a leverage of 12 inches moving 3.86 inches the rack on D through a leverage of 15/16 inch will have a drop as expressed in the following proportion.

$$12 : 15/16 = 3.86 : D$$
$$D = (3.86 \times 15/16) \div 12$$
$$D = .301 \text{ inch.}$$

Then the rod D and also the point G will have to drop .301 inch to have the cone belt move 3.86 inches.

The distance X is next found by the following method: The point E has a drop of 1/16 inch due to one lap running out. The point G must drop .301 inch to move the cone belt from a four- to a three-inch diameter. Then the distance X will be found by the following equation:

$$(27 + X) : X = .301 : .0625 \text{ or } 1/16 \text{ inch.}$$
$$X = 7.07 \text{ inches.}$$

Therefore the distance E to F must be 7 inches if the loss of one lap causes the point E on the major lever to drop 1/16 inch when the cone belt has a standard position on a 4-inch cone diameter.

As stated before, many prefer to run their cone belt about the center of the cone. Let us say that this would be on a 3-inch diameter. All other conditions would remain the same. The only change over the previous conditions is that the standard position of the cone belt shall be on a 3-inch cone diameter instead of a 4-inch cone diameter.

The loss of one lap will mean feeding three laps at four-thirds the speed of four laps, and will mean moving the cone belt to a diameter ¾ as large as when four laps are fed.

$$3/4 \times 3 = 9/4 = 2¼$$

Therefore, the diameter when three laps are feeding must be 2¼ inches or a difference of .75 inch less than what the diameter was when four laps were feeding.

As each inch of cone belt traverse reduces the diameter .25875 inch, then the number of inches the cone belt must travel to change from a 3-inch to 2¼-inch diameter will equal $.75 \div .25875 = 2.89$ inches.

Then D will drop an amount as shown in the following equation:

$$12 : 15/16 = 2.89 : D$$
$$D = (2.89 \times 15/16) \div 12$$
$$D = .225.$$

The distance X would be found by the following equation:

$$(27 + X) : X = .225 : .0625$$
$$X = 10.3 \text{ inches.}$$

This means that in running a 13¼ oz. breaker lap on the intermediate, doubling four, I found that the loss of one lap would cause the pin C to drop 1/16 inch. When the standard position of the cone belt was on 4-inch diameter the setting of the fulcrum of the major lever, or distance E to F, should be 7.07 inches to cause the cone belt to move from 4 inches to 3 inches diameter to compensate for the loss of one lap.

When the standard position of the cone belt is on a 3-inch diameter, other conditions remaining the same, then the distance E to F should be 10.3 inches to cause the cone belt to move from a 3-inch diameter to a 2¼-inch diameter to compensate for the loss of one lap.

It is all right and possible to run the cone belt anywhere for a standard position but the setting of the fulcrum of the major lever must be considered if the lever is to work as it should.

The point brought up by another contributor relative to the evener being an instrument for locking the barn after the horse was stolen, is something that a first examination would show to be possible. But this is not so.

In the first place the evener itself is not instantaneous in its action but there is a slight loss of time between the drop of the evener plates and the time the cone belt reaches its new position. During this time the lap is passing on to the feed rolls and by the time the belt reaches its new position the lighter weight feeding has reached much nearer the feed rolls than 3 inches.

And by far the greatest factor against such a thing happening is the action of the lap forming mechanism. As the lap forms on the screens, if care is taken to watch it, the stock leaving the beater is generally deposited on the screens at the exposed part furthest from the "bight" of the screens. This allows the maximum time possible for the effect of the evener to reach the screen. And the action of the air current is such that it tends to draw the same bulk of stock to all parts of the screen.

The foregoing explanation applies only to the Perham and Davis evener, but the general ideas as expressed will apply to any evener.

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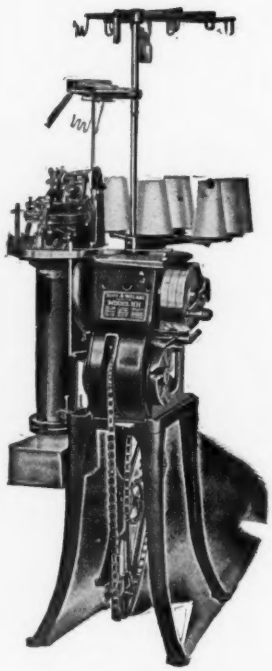

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Knitted Fabric Analysis

BY WILLIAM DAVIS, M.A.

One of the most essential requirements of those engaged in the knitting industry is the ability to analyse intelligently any kind of fabric brought into the works. The firm's travelers are required to seek out the various types of fabric which are meeting with a demand on the market and the manager of the works receives these fabrics and garments from all sources. One of the first requirements is to ascertain the gauge of machine on which such fabrics have been worked so that the correct gauge will be selected in any reproduction being made. In this calculation one must have some idea of the shrinkages which cloths in general undergo for each branch of the industry. The fabrics supplied are generally finished and to reproduce them, one has to arrive at the needles per inch or the gauge of machine on which the fabric has been made.

This question of shrinkages in the case of knitted goods is rather subtle on account of the versatility of the knitted stitch. The problem of obtaining the grey particulars from the finished fabric is much more difficult than in the case of a woven fabric where the factors, ends and picks per inch, bear a definite relation to each other in normal square cloths and one can estimate the grey particulars from one or the other of the known shrinkages which the cloths undergo.

An examination of the relation of the needles or stitches per inch as compared with the courses per inch shows that the ratio is by no means regular in knitting. In the machine we have, say, 12 needles per inch and if the yarn is correct for the gauge of the machine, we should insert from 35 to 50 per cent more courses per inch than needles per inch; that is, a fabric worked on a 12-needle machine should have about 16 to 18 courses per inch on the frame to give adequately firm and wearable fabric. This ratio is very different on the finished particulars for in most cloths we have a pronounced shrinkage in the width and comparatively little shrinkage in the length. In a circular frame of the latch needle web type, for example, we may have for an ordinary fabric an immediate shrinkage of 30 per cent as the stitches leave the needles. A machine of 19 inches diameter for them is expected when finished to give a double ply of tubular fabric 19 inches wide.

In finishing there is an added contraction due to the fulling or scouring operations. Cotton is not supposed to shrink in scouring but in practice it is noticed that the finished width is always less than the width from the frame, this contraction being no doubt due to mechanical causes, rather than the fulling operation as performed on woolen goods. In the latter branch of the industry, the problem is to prevent excessive shrinkage during the scouring and fulling operations and special precautions have to be taken to have the goods stretched out on boards in the finishing just after the fabric has been treated and when it is still in the damp state, otherwise we should have, after the fulling operations are completed, a fabric about 25 per cent narrower in some cases than is required.

In tubular fabric, excessive shrinkage in scouring has to be watched carefully and when the goods are being pressed they are made to pass into the machine over stretching devices which draw the fabric out to the width at which it is required in the finished roll. The correct width is all-important for many branches of the cut fabric trade, as the sizes are devised on given widths and anything wider causes the manufacturer to cut to waste, whilst narrower fabrics upset the sizes and shapes commonly used in the industry.

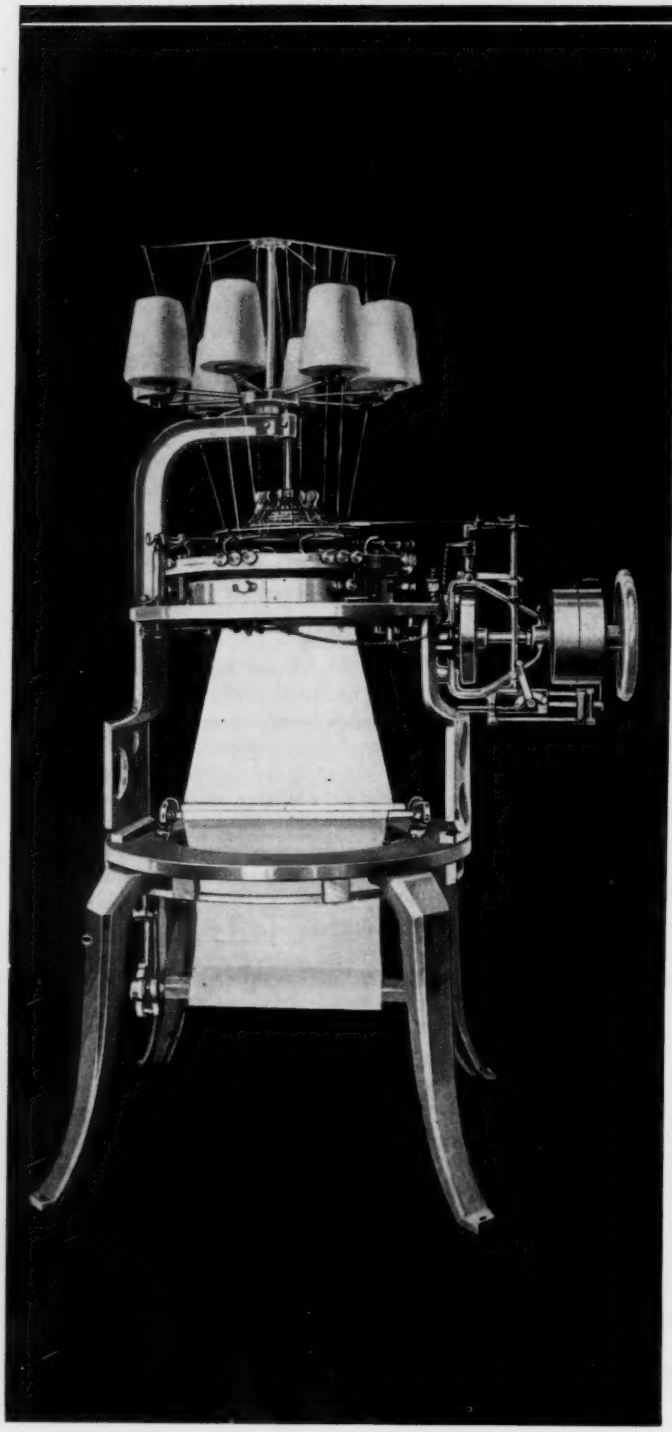
It may be of interest to follow up these observations by several examples taken from typical fabrics worked on flat and circular knitting machines which will show that this subject is one worthy of close study, and that although it appears that such items as contraction vary hopelessly in different fabrics, certain principles can be laid down, which govern behavior in each type of machine. Any observations of this factor depend on having the right kind of yarn for the gauge or sett of needles in the machine. If the machine gauge has a yarn which is too stout for it, then the mechanical factor acts as an increased bulk of material which reduces contraction for the yarn of one stitch abutts on that of its neighbor and keeps it in position.

On the other hand, if the yarn is too thin for the sett of needles and if the stitches do not support their neighbors sufficiently, there will be an immediate shrinkage on leaving the needles which is proportionately greater. In scouring and fulling the same factors control the operation. The pressure exerted in squeezing the dirt from the goods will also operate in pushing the stitches into closer contact with each other and greater contraction will result. These observations refer to plain stitch fabrics, but when we regard fancy stitches we find that tuck stitches, for example, give very little mechanical contraction on leaving the needles of the machine, while one variety of tuck stitch, termed the polka or full cardigan, actually increases in width from the frame. Rib fabrics in general have a contraction on leaving circular frames of something like 50 per cent when the rib and cylinder needles are counted. Tucked fabrics on the plain stitch also show very little contraction on leaving the machine as the extra thread inserted causes the stitches to receive full support and the width is maintained.

Example 1. This fabric is worked in 8s cotton counts on a circular frame having 10 needles per inch measured round the circle of needles where the stitches are formed. This size of yarn is standard for the cotton web trade for cutting up into all kinds of hosiery and underwear, and the fabric on this 10 needles per inch machine would have about 15 courses per inch worked to give a marketable fabric. The fabric is given in Fig. 1 and this is in the grey just as it leaves the needles of the machine. On counting the particulars in this pattern it is found that there are 16 stitches per inch in the width and 18 courses per inch in length. It is interesting to express these particulars as a ratio of needles per inch over courses per inch thus:

$$\text{Grey particulars} = \frac{10\,N\,P\,I}{15\,C\,P\,I} = .66$$

$$\text{Grey particulars} = \frac{16\,N\,P\,I}{18\,C\,P\,I} = .9$$



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This relationship is shown in many other examples from different types of machines, the ratio of needles to courses per inch in the machine is given as .6 or thereabout, while the same fabrics finished show that these two items tend to equalize each other and the courses per inch approximate the needles or stitches per inch. The shrinkage in the width therefore is much greater than that in the length. When we recollect the structure of the knitted stitch this is not difficult to explain for in the width the stitches are simply a series of thread fragments stretched in the width over needles and during the sinking of the loops over the needles the fibers composing the thread are strained into a new position; in other words, a series of internal strains are set

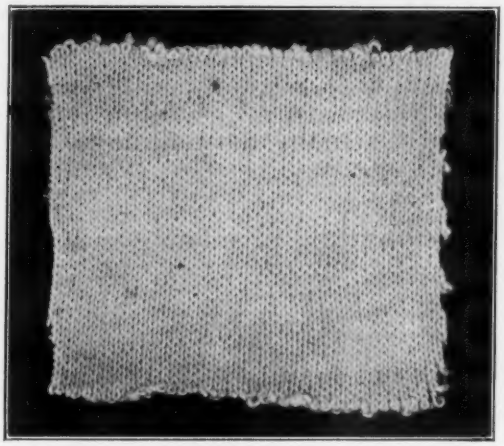

FIG. 1.

up, and when the fabric leaves the needles the fibers of the yarn take the first opportunity of drawing themselves into a more comfortable position in relation to each other.

In this example, knowing the needles per inch at which the fabric has been worked in the machine and being able to measure the stitches per inch in the grey fabric, it becomes easy to give a figure of contraction on this type of frame. Suppose the machine is 19 inches in diameter, this will give approximately $19 \times 3\,1/7 = 60$ inches of fabric on the needles and in a machine with 10 needles per inch we should have $60 \times 10 = 600$ needles in the circumference of the cylinder. In the finished fabric there are still the same total number of stitches in the web but these are distributed over a contracted width so that 16 stitches cover one inch. The new width therefore is given thus: $\frac{10 \times 60}{16}$ $= 37\frac{1}{2}$ inches in the single fabric. $60 - 37\frac{1}{2} = 22\frac{1}{2}$ inches shrinkage on 60 inches width $\frac{46 \times 100}{2 \times 60} = 37\frac{1}{2}$ per cent.

This figure can be used to work the problem the reverse way and given the stitches per inch in the finished fabric and knowing the type of machine we can find the gauge of the machine on which the fabric could be reproduced. For example, if a finer gauge of this type of machine showed 20 stitches per inch in the finished fabric, we could obtain the needles or stitches per inch at which it had been worked on the machine by using the figure $37\frac{1}{2}$ per cent shrinkage. In this case a fabric 100 inches wide on the machine shrinks to a width of $100 - 37\frac{1}{2} = 62\frac{1}{2}$ inches in the finished cloth. In the latter state the stitches are sett 20 to the inch so that the total stitches in the width are $62\frac{1}{2} \times 20$ and these are distributed over 100 inches in the machine. The result is obtained thus: $\frac{62\frac{1}{2} \times 20}{100} = 12\frac{1}{2}$ needles per inch. This would most likely be worked on the nearest gauge, say 12 needles per inch, and the fabric would be correctly reproduced.

Example 2. In most cases the fabrics handed to a knitting factory manager for reproduction are fabrics in the finished state and a second example may be given where the progress of the cloth is traced from the frame to the grey width and a step further from the grey to the finished state. In this case is given a fabric worked on the American type of latch needle circular frame having a sett of 12 needles per inch in the needle cylinder. The fabric shown in Fig. 2 is one largely employed in the knitted cut fabric trade and may be regarded as a standard. There are 16 stitches per inch and 18 courses per inch shown in the grey fabric and in the machine this ratio would be 12 needles per inch and 18 courses per inch = the ratio = needles per inch / courses per inch = $\frac{12}{18}$ = .6 and in the grey state the same ratio is given as $\frac{16}{18}$ = .9, approximately.

Let the circumference of needles in this machine be 60 inches, which gives $12 \times 60 = 720$ needles in the machine and the same number stitches in the circle of web. In the grey fabric these stitches occur 16 per inch so that the grey width is given thus: $720 \div 16 = 45$ inches. A width of 60 inches on the needles become 45 inches in the grey

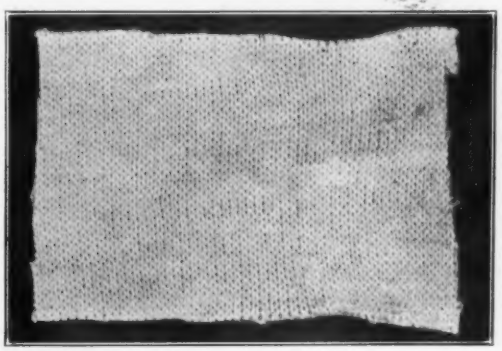

FIG. 2.

so that the percentage of shrinkage from the machine is given thus: $60 - 45 = 15$ inches shrinkage on a width of 60 inches. This is expressed as a percentage thus: $\frac{15 \times 100}{60} = 25$ per cent shrinkage in the grey.

A further measurement is taken in the finished state as shown in the pattern in Fig. 2 and this gave 18 stitches per inch. Taking the percentage on the finished fabric 12 stitches or needles per inch in the machine shows 18 stitches per inch finished and with the frame width 60 inches:

The "BANNER"

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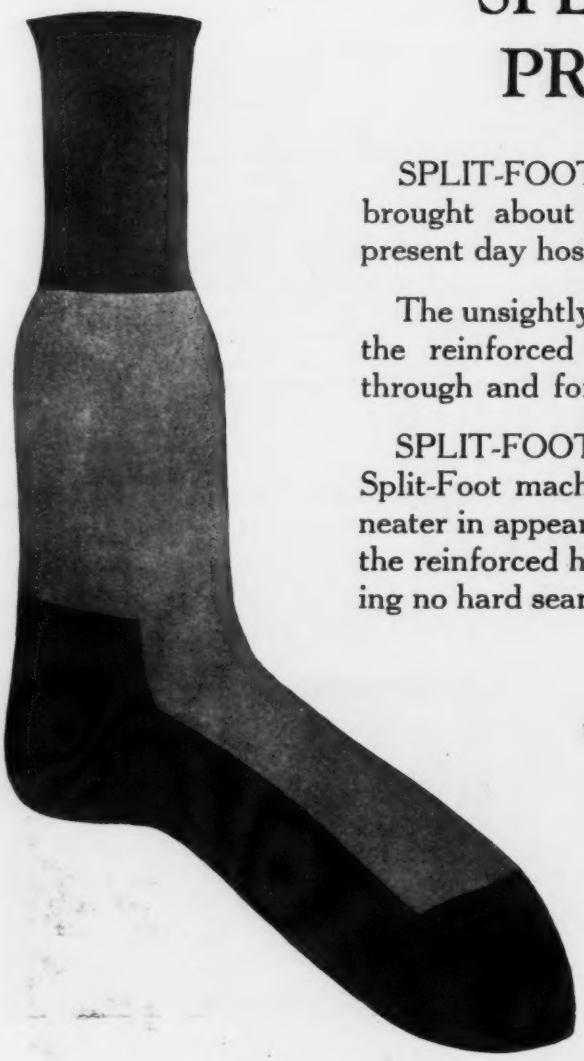

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$\frac{12 \times 60}{18} = 40$ inches wide finished. $60 - 40 = 20$ inches shrinkage, or $\frac{20 \times 100}{60} = 33\frac{1}{3}$ per cent shrinkage combined grey and finished. There are 19 courses per inch finished so that the needles-courses ratio is given thus: $\frac{18}{19} = .95$.

It is interesting to examine in this example the degree of shrinkage in the length and we can do this by taking the number of courses per inch in the frame as being 18 and the number of courses per inch in the fabric as 19. For convenience, take a length of 4 inches of fabric on the frame when the number of courses on this length would be $18 \times 4 = 72$; these are distributed so that 19 cover one inch finished; the same length of fabric finished will be $72 \div 19 = 3.8$ inches. The contraction on 4 inches of fabric therefore is $4 - 3.8 = .2$ inch and this is given as a percentage thus: $\frac{.2 \times 100}{4} = 5$ per cent shrinkage in the length.

In this case there is a contraction of 33⅓ per cent. in the width and only 5 per cent in the length, the latter figure being less than is normally the case. This figure depends again on the number of courses per inch in relation to the needles per inch. It is generally considered that an ideal fabric should have 50 per cent more courses than stitches on the same width but in practice this is not always attained and we find that a fabric worked with 12 needles per inch will only have 15 to 16 courses per inch in place of the 18 set down theoretically.

This general tendency to have a less ratio than ⅔ for "stitches-courses" has to do with important problems of production. The manufacturer can obtain his fabric density in two ways (1) Making the size of yarn such that a 50 per cent increase over the needles per inch is required in courses per inch, or (2) he can put a relatively stouter yarn into the gauge and reduce the courses per inch. The latter expedient is widely adopted in fast running machinery because it is clear that if we can obtain the same weight by using a slightly thicker yarn and putting in fewer courses per inch we shall obtain our production with fewer revolutions of the machine per yard of fabric produced. This is a vital matter in a factory having a large turnover of a certain standard fabric at cut prices and the weight should be obtained with as few courses per inch as will give satisfactory fabric. The contraction in the length depends therefore on this ratio, if the 50 per cent increase is employed, then the shrinkage will be relatively small, but if there are fewer courses per inch, the fabric will run up more in the length. On the other hand, if the gauge of the machine is too slack for the yarn employed, the number of courses per inch inserted will require to be increased over the 50 per cent augmentation to obtain a fabric of the correct consistency and in the case of woolen or half wool goods, this lack of density will require to be remedied in fulling. In some cases manufacturers try to give their range of fabrics on a limited number of frame gauges and they are forced to have considerable latitude in regard to the yarns employed on one and the same machine.

The Use of Special Mixtures in Dyeing

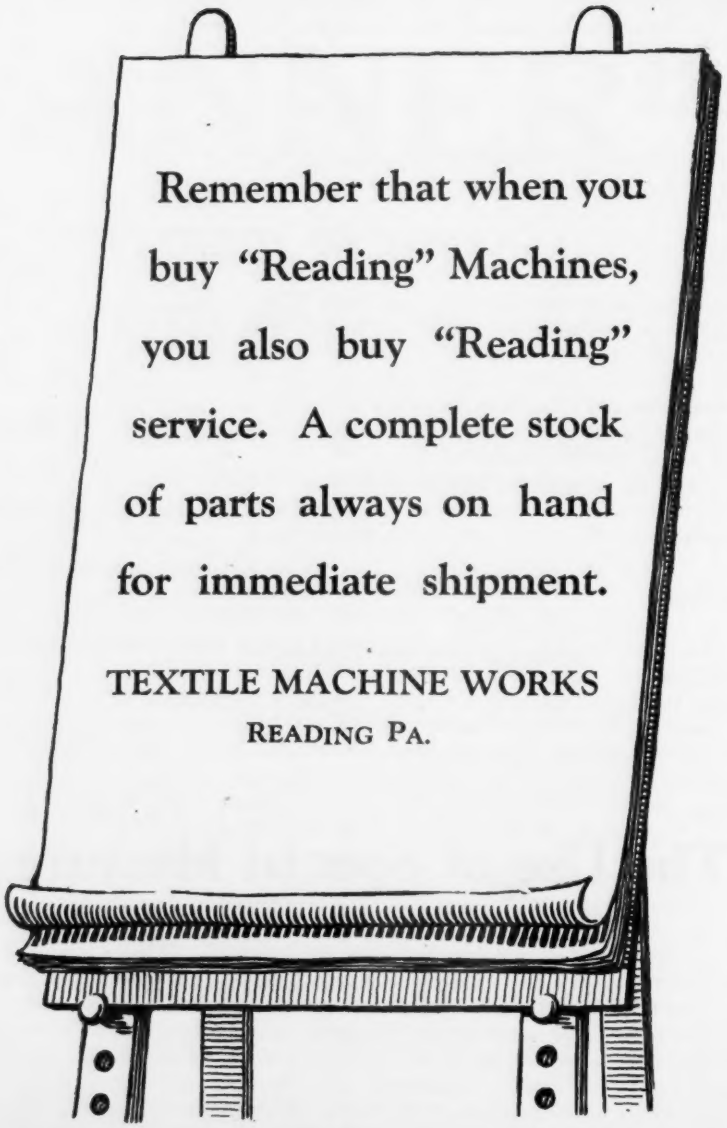
BY KENNETH MACKENZIE

The writer, first of all, will describe the routine through which a dyed shade or a product sample of dyestuff passes when submitted to a dyestuff company to be matched. The office force receives and opens the mail, and after sorting, passes on to the laboratory the matter which requires its attention. The "lab" force is composed of men who are specialists in the different phases of dyeing and who take charge of the work until it is finally completed. Each man always has several samples on which he is working. If a dyed shade is to be matched he first refers to the files, which contain swatches of all samples that pass through the laboratory, and selects the one closest to the shade which he wishes to obtain and on the same or similar kind of material as the sample. He then knows (or perhaps has to look it up in another file) which dye or combination of dyes has been used in the past for a similar shade and also the amounts used. Then by changing the proportions, adding another color, increasing or decreasing the percentages or by making some other change, he finally arrives at the shade in question. Perhaps by simply making one trial he matches the sample, but this is the exception rather than the rule. Usually he makes three or four trials before succeeding and oftentimes many more, depending to a large extent upon the nearness of the swatch from which he gets his start. A book of swatches may contain many hundreds of samples and still a new shade will be quite unlike any of them.

When a sample of a dyestuff is to be matched, first, a small quantity on a spatula blade is blown onto a piece of moistened filter paper, when the particles of the different colors in the mixture impart to the wet paper their individual color. Thus the colorist by noting the different colored spots knows how many different dyes have been used in making the mixture (providing of course it is a mixture) and knowing as he does, the use to which the dye has been put he is able to guess quite accurately the particular colors used. Then a dyeing of the sample is made and compared with similar shades so as to have a basis from which to start. The procedure is then the same as in matching a dyed shade, only that each time a dyeing, or a set of dyeings is made in attempting to match the sample, a dyeing of the sample itself is also made under the same conditions. This insures more accurate results because then all dyeings are comparative.

The foregoing briefly describes the methods of matching a dyed shade or product sample. A good colorist will complete on an average two to four shades each day when two or more colors are used to a shade, as is usually the case. As many as six to eight may be used on such material as half silk or three fiber hosiery.

After a match has been completed, unless an order accompanied it, the color company submits its results to the mill either in percentages, or pounds, ounces, and grains, of each color used per one hundred pounds of material, or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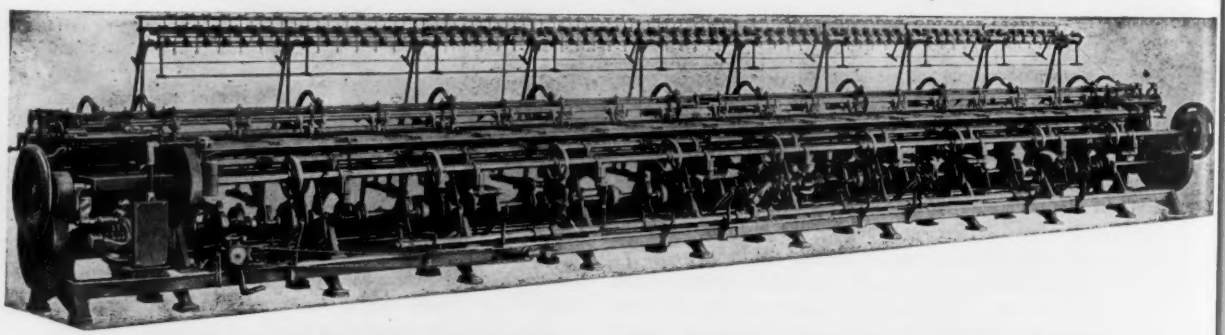

The "READING"
FULL-FASHIONED HOSIERY MACHINE

by giving the mixture of the different colors, a name and code number, according to the request of the mill. For example, a shade of direct navy blue might be matched using Direct Blue 2B, Benzo Purpurine 4B, and Direct Black. One mill might ask that the percentages of the individual colors be submitted, while another mill not wishing to be inconvenienced with the use of three colors would receive a report something on this order, "Your shade of Navy matched with our Direct Navy Blue M-1406." Now if the mill cited in the first instance orders the three dyes needed for producing the Navy, they are shipped immediately as they are type colors which are always in stock. If the mill mentioned in the second instance orders an amount of Navy Blue M-1406, the manufacturer consults his files, which tell him that it is composed of Direct Blue 2B, Benzo Purpurine 4B and Direct Black in certain proportions. An order is then sent to the mixing room to make up this mixture, which is accomplished by putting the correct amount of each color into the mixing apparatus, and allowing it to turn until evenly mixed. (One to three hours.) A sample is then taken to the laboratory where it is tested against the original dyed shade or product sample, and if found all right the mixture is ready for shipment. Sometimes it is necessary to shade it by adding a small amount of one of the constituent colors, for it does not always come out exactly right, any more than every batch of goods passing through a dye house does. When this is the case, after an addition of color has been made, a mixer must turn one to three hours longer, so that the added color may be thoroughly incorporated with the rest. Then if correct, after testing as at first, the mixture is shipped, and if not, further additions are made and mixed in, until the final test shows that the product will give the desired shade.

Most of the mixtures prepared for half silk or three fiber hosiery, or cotton and wool fabrics, contain from five to eight colors, the average being six. It has been found that in such combinations the colors tend to separate out into layers due to the vibrations they are subjected to in shipping and to differences in their specific gravities. To overcome this tendency calcined glauber salt or fine common salt is added in considerable quantity. They seem to act as binders on the colors reducing the sifting or separating of them to a minimum. This practice can not be considered as one of adulteration any more than the addition of such material to the type colors for standardization purposes, and in quoting prices due allowance is made by the manufacturer.

The reader has now some idea of the routine followed by the manufacturer in matching shades and the subsequent making of special mixtures for the mills. Let us now consider the extra time, work, equipment and expense involved in preparing them.

It usually requires at least one day to thoroughly mix, test and prepare for shipment such mixtures and correspondingly longer if additions of shading colors are necessary. Each new mixture means a new type or standard that the company must bottle, label, and record, so that when future orders are filled this sample may be used as a standard. Also a sample of each shipment, whether a new type or one that has been previously made up, must be treated in a like manner, so that in case of complaint the company has a sample to which it can refer. Type or standard colors, which are always kept in stock may be standardized in large quantities for they are always in demand and are not especially made for one customer as the special types are. A mill may order as little as one pound (this is the minimum order that most dye companies will accept) of a special mixture and five, ten, and twenty-five pound orders are quite common. This means that different sizes of mixing machinery must be used than is necessary for mixing the large quantities of standard colors, as it would hardly be possible to mix ten pounds of dye in a mixer constructed for two thousand pounds.

The compounding of special mixtures, therefore, places extra expense upon the dye manufacturer in the way of additional machinery, the cost of its upkeep, and of the power and labor necessary for its operation, additional skilled help for the testing of these mixes and extra clerical help in keeping files and records. This additional expense of course is borne to a large extent by the consumer but at the same time there is very little, if any profit for the manufacturer in many of the orders for special mixtures, particularly the small ones. It may cost a company four or five dollars to match a shade on which they get a one pound order, but it would hardly be advisable to add this cost to the selling price of that particular order.

Next let us consider the use of ready mixed colors from the consumer's standpoint. The only advantage of their use is their convenience. A dyer simply has to make one weighing of the required amount of dye, dissolve, and add it to the bath. To a garment dyer who buys a pound or two of color at a time, this is an advantage to be considered, but to a mill which uses thousands of dollars worth of colors in a year the first consideration should be cost and how to reduce it if possible. As has been previously pointed out, special mixtures add additional expense to the operating cost of a dye maker, and since the consumer pays for this, it is, therefore, more expensive for a mill to buy a ready-to-use mixture than to buy standard colors. Another disadvantage, if a mill depends upon a color company to match its shades and mix the colors for producing them, is the time cost. It is consumed in the sending of the shade, the matching of it, the mixing and shipping of the colors, so that a mill is fortunate if able to proceed with the dyeing in a week's time. This delay may not be of importance in all cases, but in many instances speed is essential. Another drawback observed by the writer is, that oftentimes several pounds of a mixture will be left over after the demand for that particular shade has stopped, so that in time there are a number of odd lots of different mixtures lying around in tins and kegs, which perhaps eventually are thrown away.

It sometimes happens that a mixture of dyes will not give exactly the same results in the dye house as in the laboratory, due to the dyeing conditions being slightly different. A dyer will use the amount recommended by the maker and find that his shade is not exactly right. Then he must resort to shading which means that he must send for shading colors, if none are on hand, or he may return the dye as being off shade. Either course causes delay and is another disadvantage.

To the writer's mind the ideal condition exists in a mill when it employs a man, or men capable of matching any shade by the use of certain ones of a few standard or straight colors which have previously been determined to be of the best value of their kind for the class of work in question, and which are always kept on hand. A shade is

(*Continued on page* 431.)

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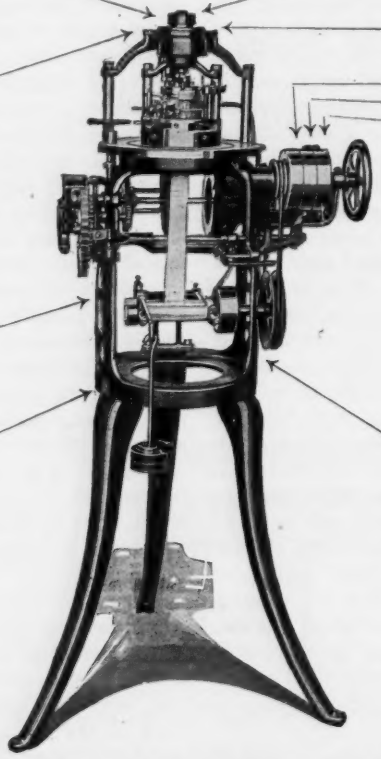

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How Can Curling Be Prevented?

EDITOR COTTON:

I have read with interest your columns under "Knitting Kinks," and have found this material of great interest. If you will permit one from this side to take part in your discussions, I would like to open by relating a difficulty experienced in the working of knitted fabrics.

We deal with dyed worsted yarn knitted into circular fabrics and making up goods from same. The yarns are knitted up on standard circular machines of various makes and finished on calendering machines with steam-heated rollers, and then cut for our various products. Our difficulty comes when the fabric is cut, owing to the curling, and we should be pleased to learn from your readers—many of whom must have encountered this difficulty—as to how they would treat the fabric, or what steps would be taken, to prevent this. C. M. (LEICESTER, ENGLAND)

Preventing Streaks in Hosiery Dyeing.

EDITOR COTTON:

"M. H. (Tenn.)" states he is having trouble with getting even dyeing on the mercerized top, heel and toe of an artificial silk plaited stocking, dyed brown. In reading his query, I find he is dyeing at a low temperature. This cannot be done throughout the dyeing, as it requires the heat to make the dye penetrate the heavier mercerized yarn portions. The dyeing should start at 120 degrees F. and be slowly raised to 180 degrees F. and allowed to dye at this temperature.

First, he should be positively certain that the dye is well dissolved so that it will not spot the goods; then have the goods well saturated with the water (it is advisable to boil them out for one hour first), and then proceed with the dyeing.

If, after this, the mercerized portions of the hose show streaks, then it is likely the result of unevenly mercerized yarn, which can be eliminated only by the processing department of the yarn mill. Uneven mercerizing will cause streaks, but not spots. L. S. W. (TENN.)

EDITOR COTTON:

In response to "M. H. (Tenn.)," with reference to the half-hose of artificial silk plaited with mercerized, which he states he has to dye at a low temperature, and on which he says the brown color goes onto the artificial silk all right but shows up streaky in the mercerized heel, toe and top—

Artificial silk dyes so differently from mercerized cotton that it is not to be expected that the two fibers will dye the same shade in the one dyebath, and especially at a low temperature. Direct dyes are used almost exclusively for this class of hosiery, the dyebath being prepared with a sufficient quantity of dye to produce the desired shade, together with 10 to 20 pounds of crystal Glauber's salt, and one to two pounds of Turkey red oil. The wetted-out hosiery is entered at 100 degrees F., and the temperature slowly raised to form 150 to 180 degrees F., and kept at that latter temperature for about a half-hour. Steam is then shut off, and the bath allowed to cool during 20 to 30 minutes. The hosiery is then lifted out, rinsed, whizzed and finished.

It will seem from the foregoing that heat and time are necessary, besides a proper combination of dyes to produce the desired shade, unless a "straight" dye will do the work.

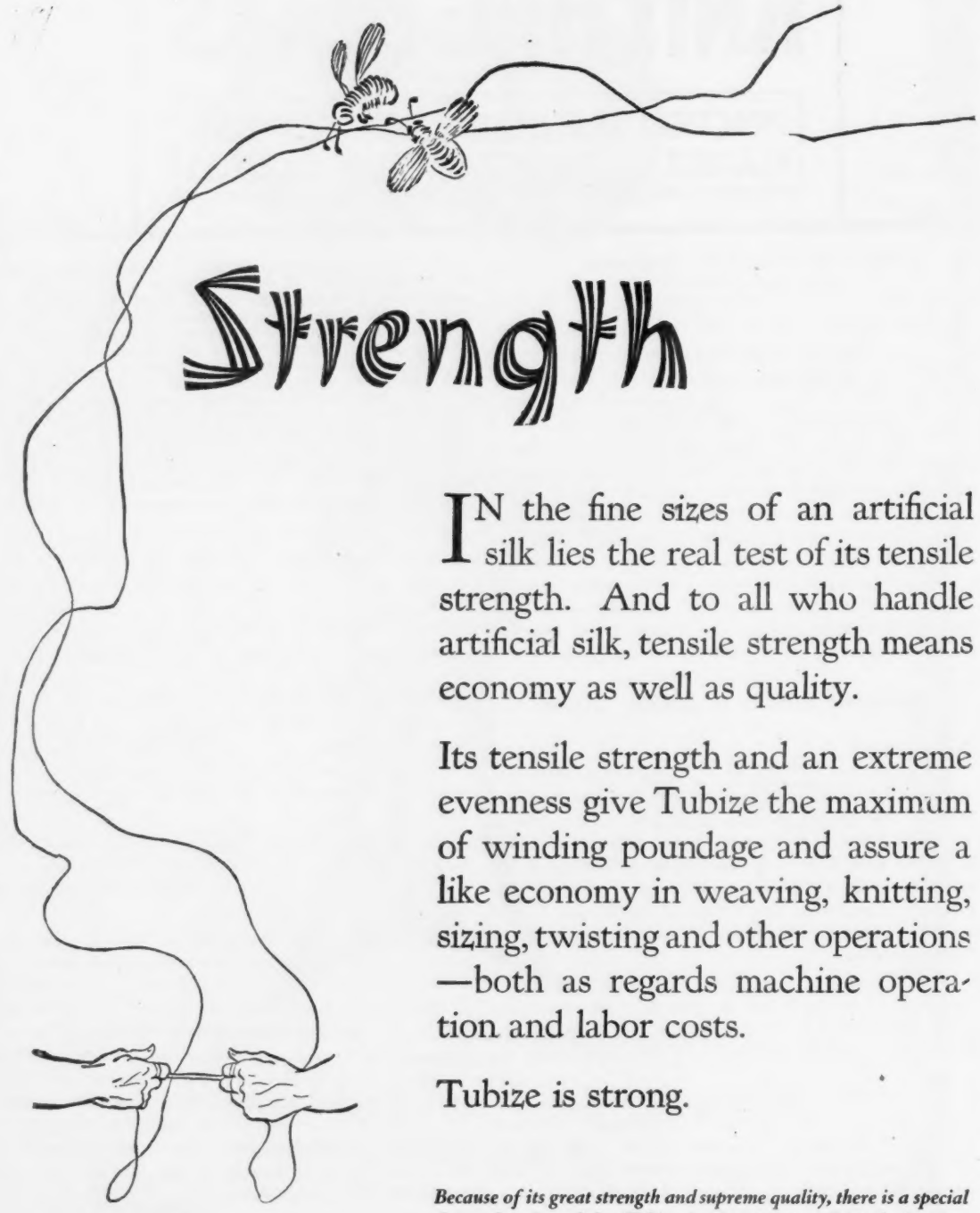
It is always best in dyeing hosiery made of such a mixture of yarns to make, or have made, a few preliminary trials with one or two pairs of half-hose so as to accurately determine the exact conditions for carrying on the work, and also the proportions of dye and chemicals. This suggestion is all the more important since there now are several brands of artificial silk on the market, each of which takes up dye differently from the others; also, only perfectly mercerized cotton yarns should be employed, for the reason that there is a wide difference in mercerizing as carried out in various plants, frequently no two lots are mercerized exactly the same, and in consequence, yield different shades, even with the same dye. G. G. (N. J.)

EDITOR COTTON:

Replying to "M. H. (Tenn.)," regarding the uneven dyeing he experiences on the hosiery made of artificial silk and mercerized yarn, in which he gets dark streaks in the mercerized heel, toe and top.

The first thing to consider is that some dyes "will" and other dyes "won't." In other words, care must be taken

We invite our readers to make use of this department for the discussion of any and all problems arising in connection with the knitting mill from the office to the packing and shipping departments. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. All questions will be answered as promptly as possible. The names and addresses of the contributors must be given, but will be held in confidence and a pen name substituted when printed. All accepted contributions other than questions will be paid for after publication. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.



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in the selection of the dye which should be first tried out on a small scale in the laboratory to see that the promise of the dyestuff manufacturer is confirmed. Direct colors are used and the bath is usually made up with five to ten pounds of Glauber's salt and one or two pounds of Turkey red oil. The goods are entered at 100 degrees F. and run slowly up to 180 degrees F. They are kept at this temperature for about one-half hour and cooled off for another half hour, washed and finished. J. A. B. (PA.)

EDITOR COTTON:

With reference to the trouble "M. H. (Tenn.)" is having with uneven dyeing on the mercerized heel, toe, and top, of a stocking of artificial silk plaited with mercerized yarn, I suggest that he give the following method a trial:

First of all, be sure that the goods are thoroughly boiled out. This is best done by boiling for a half-hour with one per cent of a good soluble oil. Cool and extract most of the water. The heels and toes should be soft. The extracted goods should be immediately entered into a warm dyebath (from 80 to 90 degrees F.). Have about one per cent of a good soluble oil in the dyebath. By all means boil the dyebath for a few minutes before completing the dyeing. Boiling will tend to make the artificial silk take more dyestuff, but the resulting hose will be even. If the goods are not now being boiled, this change will alter the shade. However, the shade can be matched at a boil. Perhaps he can increase his dyestuff slightly and greatly decrease the salt to secure the shade with the dyestuff on hand.

Remember, dyeings that have been boiled are easier to duplicate from batch to batch than those that have not been boiled. The good results that can be obtained from boiling will justify the trouble of rematching.

Summing up, I believe that the essentials of an even dyeing, on this material, are: (1) Thorough boil-out of material; (2) enter dyebath at low temperature; (3) soluble oil in dyebath; (4) a small amount of salt (added at beginning); (5) slow increase in temperature; and (6) boil for a few minutes at least.

I sincerely hope this will be of help. P. S. (N. C.)

Rules for Reverse Plaiting.

EDITOR COTTON:

Replying to "Contributor No. 214," regarding reverse plaiting. He did not mention the make of machine he is operating, or the yarns he uses. If he wishes to put the yarn he previously used for backing on the surface he would reverse the yarns in his stand, and also the holes in the yarn fingers, altering the tension on the thread tensions accordingly; or in other words, it would mean to reverse the threading of the yarns to get the results.

If he will submit a sample of the fabric he wishes to duplicate or a sample of the fabric he wishes to reverse, and furnish the name of the machine and the yarns used, I could get the answer in a short time.

BOB (CANADA)

EDITOR COTTON:

Responding to the question of "Contributor No. 214," who is having difficulty in reverse plaiting, he is right in stating the needles are bent to get this effect. However, it is hard to know just what to tell him as he did not mention the kind of machine he has. The reverse plaiting effect is secured by bending the needles just enough and lining them to the inside. If he is using a Scott & Williams machine, he can procure an adjustable throat plate which he can and should move up closer to the needles, for in doing this the throat plate should be set close enough to the needles to eliminate his difficulty in the heel and toe.

His question was not complete enough, but the foregoing may help him. If he will tell us his make of machine, perhaps we can give him some more specific suggestions.

S. B. N. (TENN.)

EDITOR COTTON:

In regard to reverse plaiting, will say that this is somewhat new and is causing more or less trouble. From experience and information obtained, I find that some mills are using one finger and some two fingers for plaiting; in either case the needles are bent back to get the stripe. From the facts given by "Contributor No. 214," who asked the question in a recent issue, I assume he is getting the desired effect and stripe, but the trouble occurs in the heel and toe, and in this particular case I would say that he must have the needles bent back too far, and this causes the heel and toe trouble, such as making menders, cutting out, throwing off and breaking needles.

I would suggest that he bend the needles forward until they effect the stripe and then try it and see if the heel and toe trouble will not be over. If it should be, then bend the needles back a little at a time to regain the proper stripe.

This class of work was done some time back on the stationary needle cylinder machine and it was only necessary to bend the needles very little to get the same effect as we are now getting on the revolving needle cylinder machines. OLD KNITTER (PA.)

EDITOR COTTON:

This is in reply to the query of your correspondent regarding the trouble he is having in the heel and toe in reversed plaiting. If I understand what he is trying to do it is to make one course of cotton and then one of silk. In case his difficulty is with the needles dropping stitches, the carrier ring should be so adjusted as to be as close as possible to the bent needles. The latch guide then can be adjusted so that it will help to keep the latches down.

If this trouble is caused by the machine cutting holes, the sinker cam could be too far in, causing it to press hard against the stitch, with the result that it will cut the yarn where the bent needles are. This trouble can be eliminated by releasing this cam just a little. Then the stitch cam should be adjusted so that it will pull the needles just far enough to make the stitch, because the bent needle has a tendency to pull against the stitch as it goes down, and if it is pulled too far down it will break off.

I trust these suggestions will be of help to your correspondent in eliminating his difficulties. G. R. (GA.)

EDITOR COTTON:

I note in the January number of "Knitting Kinks" the question of "Contributor No. 214" regarding the troubles he is having with reverse plaiting. In response I will outline all the details in connection with reverse plaiting on both horizontal and vertical stripes, from which your con-

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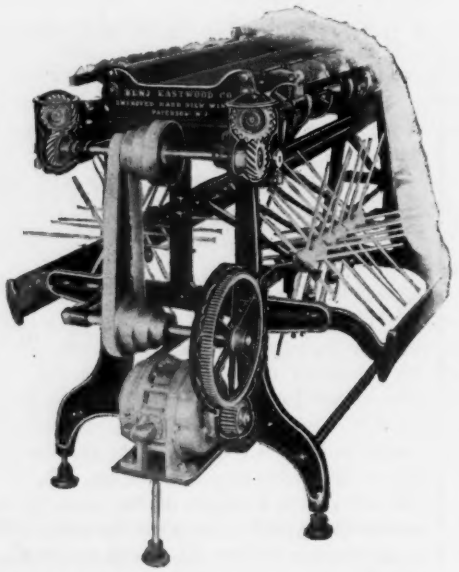

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tributor and the other readers can select points of interest to them.

Reverse plaiting means the changing of the position of the yarns as they are formed into loops by the needles. Circular reverse plaiting is accomplished by having the face and backing threads fed to the needles by two separate feeding fingers. These fingers are under the control of a pattern drum for automatically changing the location of the fingers so that for a predetermined period one of the two yarns will be placed in the needles to form a loop with its yarn showing on the face of the fabric, the other finger in a place to put its yarn into the needles to form a loop with its yarn on the inside of the fabric. The stripe is made by reversing the position of the two feeding fingers mentioned.

At the same time, the tension on each yarn must be changed so that the yarn fed to the needles in a position to form the loop with its yarn on the face has the greater amount of tension thereon. It is well known in the trade that the face yarn must carry about all the tension that the yarn will stand, whereas the backing yarn should be quite the reverse, with as little tension as possible.

Vertical stripes are procured by reversing the face yarn to the back through distorting the yarns by having the needles which form the vertical stripe set back beyond the diameter of the regular knitting needles. To secure this result, have the machine filled with what is known as the forward hook needle of a gauge or thickness of needle to suit the cylinder in which the needles are to be used. Then set the machine to plait in the ordinary manner, and after perfect plaiting has been secured on all of the forward hook needles, bent back or straight back needles should be inserted where a stripe is desired.

The commercial limit or practical limit of the width of a stripe of this character has been found to be three needles adjacent to one another. A greater number of needles than this has a tendency to permit the yarn to twist again to its normal position and show what is known as a flash or misplaiting in the middle of the group of the bent back needles in the event of there being more than three of them used to make a stripe of three needles wide.

The very best results are obtained by limiting the vertical stripes made with the straight back needles to two needles. With a very high grade of yarn, such as fiber and tram silk, three needles can be used. With high grade smooth yarns the vertical stripes can be secured very successfully with the main or large group of needles in the cylinder being of the forward hook type and the vertical stripes of the plain straight back old-fashioned type needle. If a soft type of yarn is used, such as used for coarser gauges of 160 to 200 needles, which are yarns maybe of a cashmere and silk or cashmere and fiber or mercerized, the vertical stripe can sometimes be improved by setting the straight back needle back an additional four or five thousandths. The set or bend in the straight back needle should take place very close to the top of the needle or as near the hook as possible. The limit for this additional bend is five thousandths, as any greater set back will make the knitting of the heel and toe gore impossible.

The use of straight back, or what "Contributor No. 214" calls "bent back" needles, does increase the menders in the heel and toe, due to the fact that the needles are set back farther away from the throat of the sinker, and in a measure the stitches upon these needles are not as well controlled by the action of the sinker as the stitches are upon the forward hook needles. This condition can be helped somewhat by relieving the sinker cam slightly back of the extreme throw-in point. Grinding of the cam in this manner permits of the cam being set in slightly farther than a broad nose cam could be set without cutting, and assists in preventing the roll-off stitches of which "Contributor No. 214" complains.

Heels and toes can be made with less menders on bent back needles if the heel and toe yarn is back-wound and treated with some of the many solutions that are procurable for the softening of yarn for knitting purposes.

A. G. (N. Y.)

Overcoming Troubles on a Record Looper.

EDITOR COTTON:

Your readers who operate the Record looper, with the corkscrew hook, may have had trouble with the looper skipping, or the loop falling over on the needle before the hook catches it.

This difficulty worried me quite a bit; finally I overcame it, and pass the following suggestions along to anyone using this machine:

Have the hook running as low as possible so that it clears the needle on the back side.

Have the hook come in as quickly as possible to catch the loop as soon as it is formed large enough for the hook to take it up; so that the loop will not be formed too large, which causes it to fall to one side.

See that the needle eye does not go in on the back side more than 1 1/32 inch past the points on the machine.

These are the most important things I did to get my machines to going properly. If anyone who has had experience on this machine has any further suggestions, it would be interesting to get a discussion started in "Knitting Kinks."

M. H. S. (S. C.)

"Human Nature" and Production.

EDITOR COTTON:

I want to tell you and the readers of "Knitting Kinks" about a "kink" which we instituted recently to very good advantage to both the mill and the girls in the looper room.

We make half-hose, and not very long ago we got behind about 1,100 dozen in the looping department. On Saturday we posted a notice that beginning on Monday morning, the superintendent would issue to each girl a "day's work" of stockings to be looped; and that when these were finished, the girl could go home if she desired.

In alloting the work, the superintendent was careful to give each girl just a little bit more than she had been doing. In other words, if a girl had been looping on an average of 35 dozen a day, he would give her 40 dozen.

The result was that we profited by touching that streak of human nature which makes us work a little harder if we know we can get through and go home. It was "no time hardly" until we had caught up. A more permanent result was that the girls found out they *could* loop more than they had been looping, and thereby make more money for themselves, and now practically every girl we have is turning out more work by ten to fifteen per cent, and making that much more money.

H. D. C. (TENN.)

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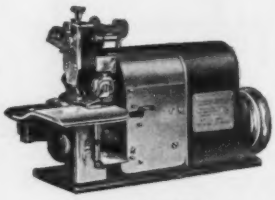

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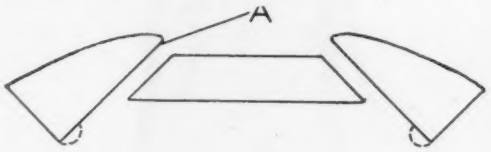
Suggestion for Preventing Broken Hooks.

EDITOR COTTON:

It's pretty hard to tell what is causing the trouble for "Contributor No. 3670" if, as he says, the hooks are broken just every now and then. However, the following may help him, or somebody else who is having about the same kind of trouble.

I will use the accompanying sketch to illustrate my point. This is supposed to represent the stitch cams and the center cam. The needle butt is caught by the stitch cam at *A*, and is carried down the side at about the angle shown. If, by chance, the cam should have a form shown by the dotted line at the bottom, this would change the angle of



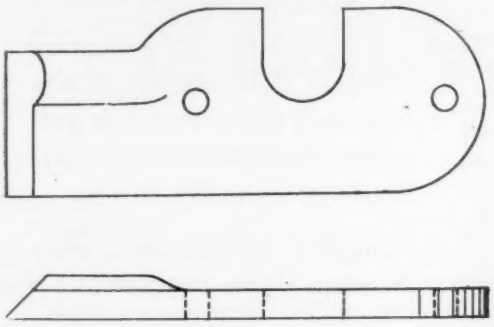
travel of the needle, wouldn't it? At about this point, the stitch is made, and the greatest strain is on the needle, if the cam is shaped this way then there is too much "dip" in the angle, and the needle is jerked down, and this could cause the hooks to be broken.

The remedy for this, as I see it, would be to grind the cams along the line shown, removing the bulge at the bottom so there would be less strain on the needle at the stitch.

Then, another thing: one time we had some machines on trial, and were running them at around 300 r.p.m. We couldn't determine what was making the hooks break, and a man from the machine factory came and told us to slow them down, which we did, along with grinding the cams properly, and the trouble stopped. I don't know how fast "Contributor No. 3670" is running these machines but this might contribute to his trouble. G. E. H. (TENN.)

EDITOR COTTON:

As to what will cause the hooks to be broken off of the needles, as described by "Contributor No. 3670," among other things that will cause this is for the stitch cam not



to be pulling the needle as it should. The needle should not touch the cam except on the edge next to the cylinder. This applies to both the front and the rear cam. The cam should be ground as shown in the accompanying rough sketch, and the needle should touch only at the edge indicated. H. H. W. (GA.)

EDITOR COTTON:

In answering the question with regard to Banner machines breaking needle hooks, I should make the following suggestions:

First, make sure the count of yarn used is not loading the hooks, as the latches, when closing, naturally cause the hook to suffer. See that the latch ring is not too low, also see that the sinkers are tracking evenly and are not to one side more than to the other when the needles pull down to form the stitch.

Overspeeding of machines will cause needles to crystallize and snap at random. Also, the length of the stitch cams has a great deal to do with hook and latch breakage. If the conditions as to broken hooks do not change after trying everything else, try putting in new stitch cams.

If the trouble is general, and not confined to one machine, I would look to the speed of the machines first; second, the yarn may be too hard twisted.

He may have run into a batch of needles with too high a temper. Various reasons will cause needle hooks and latches to break, and if these suggestions do not overcome the trouble, let your correspondent give us the gauge, diameter, speed and counts of yarn used, and we maybe can tell him more about it. BOB (CANADA)

EDITOR COTTON:

I note the trouble that "Contributor No. 3670" is having with a few Banner machines breaking off the hooks of needles. I had the same trouble with a Banner machine and it had me guessing for a long time until I finally located the cause of the trouble.

I found that the stitch ring, or as some fixers call it the inside ring, which is soldered to the inside of the needle cylinder was not lined up true with the sinker head or outside sinker ring. This being the case it would cause the sinker to be thrown to one side and the needle coming down would strike the sinker and break the hook off. In this case it was only a fraction of an inch out of line, but after getting it set properly the trouble stopped. Of course should the stitch ring or inside sinker ring be loose it would give the same trouble.

As with your correspondent, our trouble happened so that some days it would break quite a few needles and then stop for a week or more. After adjusting the stitch ring or inside sinker ring the trouble was over.

OLD KNITTER (PA.)

EDITOR COTTON:

Replying to "Contributor No. 3670," who said he was having trouble with hooks on a Banner machine breaking every now and then:

I wonder if he could trace this difficulty to heavy yarn coming in on him. When the yarn goes to the hook, that is the place where it puts the most strain on the needle, and it may be that heavy yarn coming in there is more than his needles can stand.

This is especially true if his needles are too highly tempered. We had this trouble once, and I found that we had secured a lot of needles that were highly tempered, and along with some heavy yarn they would snap every now and

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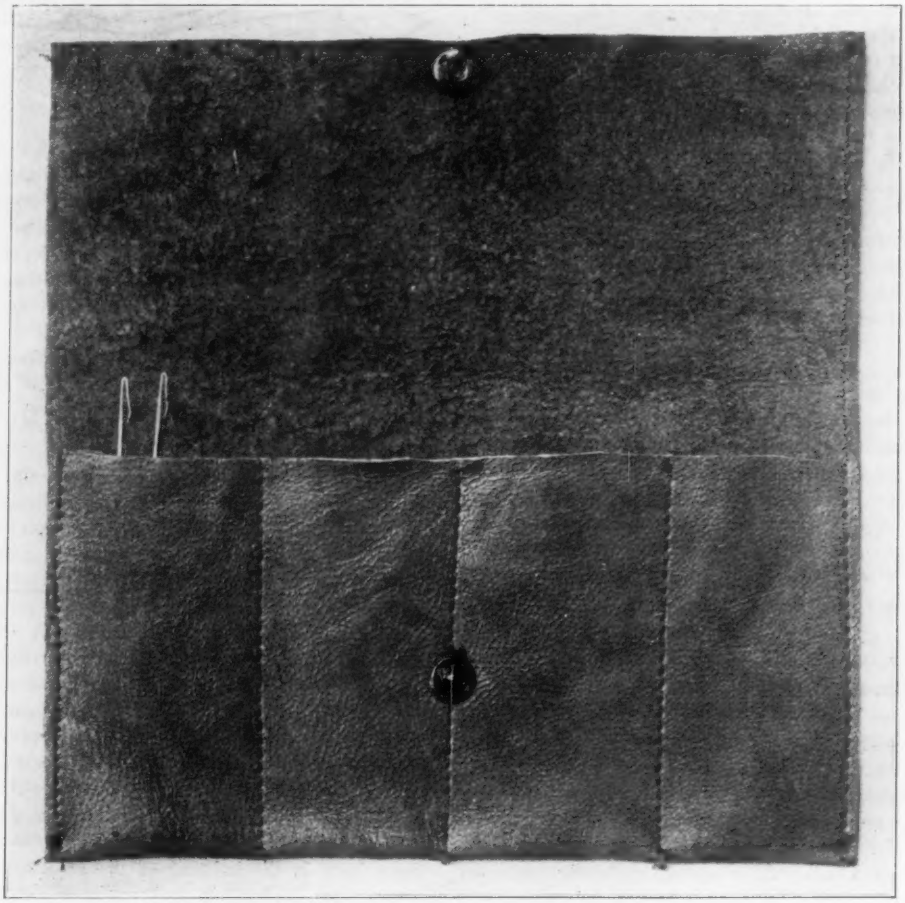
then. I suggest that he also look at his needles and find out if they are tempered correctly.

As to the fellow who wants to know how he can make the looper course on a French welt made on a double-feed ribber come together even and prevent the pucker he gets when he transfers, I don't know what to say. It seems a physical impossibility to remedy this. The looper course is not made on the stitch that the cam holds up, but is made on the next stitch, and by the time that gets around, the other feed puts in another stitch, so that the ends of the course are bound to be two stitches "off center," you might say. This is something we also would like to know if it can be done, because we have that "pucker," too.

J. M. (TENN.)



A Handy Needle Case.

EDITOR COTTON:

The photograph accompanying this letter shows a very convenient proposition—a handy leather needle case, designed for hosiery mill fixers and knitting room foremen.

A glance at the photograph will show the practical knitting mill man the advantage of this little case. As shown in the picture, it has four pockets, two for good needles, short and long butts, and two for bad or broken needles.

In addition to its being convenient for the fixer or foreman, the use of this case will serve another very important purpose, that of helping to keep the machines and the floor of the knitting room clear of broken needles.

The case can be used for full-fashioned machine needles as well as for needles for seamless machines.

OLD KNITTER (PA.)

Preventing Trouble with a Navy-and-White Combination.

EDITOR COTTON:

This is in reply to the question you published from the man having trouble with the navy blue that was supposed to dye the cotton yarn staining the silk in a blue-and-white combination, white pure silk with dyed cotton yarn. It seems to me the people he gets his dye from could straighten him out on this, but as a suggestion I should tell him to add some acetic acid. I should try adding about 1½ pounds of acetic acid for the 75 pounds of goods. Inasmuch as his trouble is in the rinse, let him put it in there first, and if that does not help, then add the acetic acid to the dyebath. This, I believe, will hold the dye off the silk.

H. E. B. (TENN.)

EDITOR COTTON:

I notice "Contributor No. 3669" is having trouble with the dye running in combination work. I will advise that in trouble of this kind, in this section of the country, two

methods of prevention are used. One party gets around it very nicely by flooding the dye-bath instead of pulling the plug before washing. This prevents the excess dye from depositing on the silk. Then it is washed in a very strong common salt solution.

Another party has gotten around it by dyeing in a soap bath only, omitting the phosphate of soda and the soda ash, and keeping the bath at 135 degrees Fahrenheit.

This information comes from practical dye-house men who have had exactly the same trouble as your correspondent. J. A. B. (PA.)

EDITOR COTTON:

Replying to "Contributor No. 3669," who is having difficulty, in making a combination hose of cotton and pure silk, with the cotton dye staining the silk which is supposed to remain white—

In dyeing combination silk and carded cotton yarn in the same bath, in order to obtain two-tone effects, it is never advisable to use soap in the dyebath, as the average soap contains too much alkalinity, and being so strongly alkaline has a tendency to cause the pure thread silk to grasp the direct blue which is only supposed to have an affinity for cotton. If your correspondent will try leaving out the soap from the dyebath, and putting in about three to five per cent of sulphonated castor oil, he will receive much better results, as most of these oils are left on the acid side, and where they are not, the oil is usually very mild in alkalinity.

The reason he does not experience any trouble with washing out the single hose under a faucet is because the single pair has a large amount of water flowing into it, while the batch of 75 pounds in his dye tub is in a smaller amount of water, and the direct blue that washes from the cotton is taken up in part by the pure silk, on account of the strong alkaline solution of the dye bath.

There are also other means of clearing up the pure thread silk after dyeing, but I will not dwell upon them, as the foregoing should be the solution to the problem in hand.

L. M. S. (TENN.)

EDITOR COTTON:

In answer to the "Knitting Kinks" inquiry regarding the bleeding of a direct navy and white heather, we suggest a trial of the following method:

Make the dyeing as usual, except that the soap should be reduced to 4½ pounds per 100 pounds of goods. The amounts used seem to me excessive, unless the goods are over 50 per cent silk. After dyeing, drain the dye liquor. Fill tank with fresh cold water. Add ten pounds of common salt to each 100 gallons of water. Wash for about ten minutes. Drain this wash water, and extract at once.

Do not give the goods a severe wash. Some mills do not even wash at all. They simply extract for one-half hour and leave a small quantity of soap in the goods. This makes them very soft, in fact, a great many hosiery softeners are made largely of soap. The dyeings referred to as not being washed, are made with four per cent of a pure soap in the dye bath. The hose are entered hot and dyed in a cooling bath. Salt is added in the dye-bath at a low temperature. A specific dyestuff can be given on request that will make a navy blue heather under these conditions.

L. G. (N. C.)

An Adjustable Dividing Cam.

EDITOR COTTON:

Recently I found an adjustable dividing cam operating on a Scott & Williams machine, for making the double sole shallower or deeper as desired. The cam was invented by W. L. Denson and G. E. Brunnitt, of Spartanburg, S. C. I have secured permission to describe this adjustable dividing cam for the interest of the readers of "Knitting Kinks."

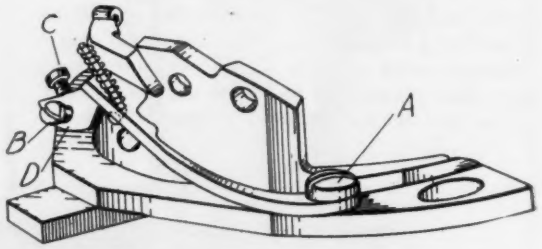


FIG. 1

The two sketches shown herewith will illustrate the idea of the invention to the practical knitter. Figure 1 shows the cam box as removed from the machine head. The dividing cam is secured to the cam box by means of the set-screw *A*, and for purposes of illustration, the cam is shown withdrawn from the slot in which it works. A portion of the spring which holds it in position is shown.

In Figure 2 is shown a sectional view taken transversely through the cam box. The essential parts of the invention are the adjusting screw *B* and the set-screw *C* in the extension *D*. The adjusting screw *B* may be moved inward or outward to to make the cam to engage with the medium butt needles also if desired. The set-screw *C* is to hold the adjusting screw in place. In Figure 2 it will be noted that cam is adjusted to miss the medium butt and short butt needles, but contacts with the long butt needles to draw them down in the knitting of the stocking, allowing the yarn finger to drop in and catch on the medium butt needles after the cam has forced the long butt needles downward out of action. Should it be desired to adjust the cam so that the long butt needles and the medium butt needles will be engaged, the adjusting screw may be moved accordingly.

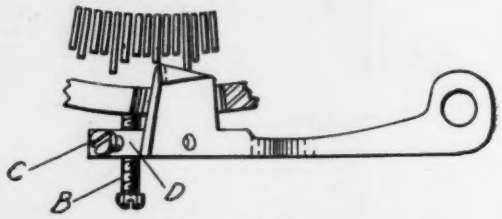


FIG. 2

Patent on the device has been secured by Mr. Denson and Mr. Brunnitt. If your readers want any further information, we shall be glad to furnish it. Y. L. M. (S. C.)

W. S. WEIDNER, for the past eighteen months superintendent of the Oak Lane Knitting Mills, Inc., Murphy, N. C., is on a business and pleasure trip to Pennsylvania, New York and the New England states.

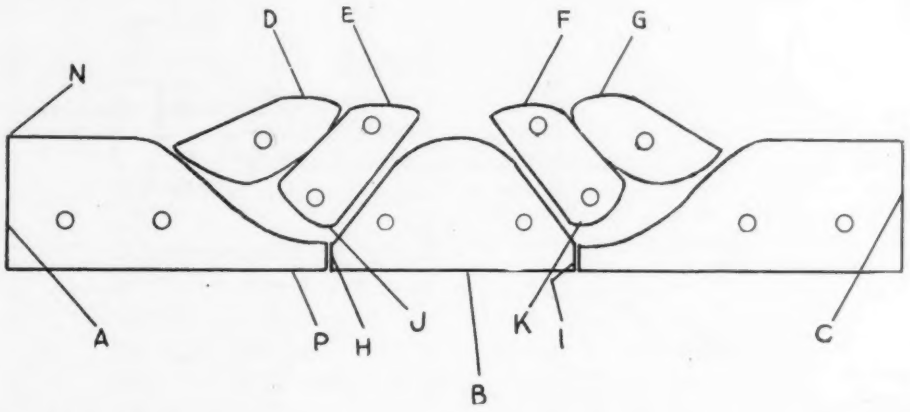
Fitting Up the Cam Box.

EDITOR COTTON:

I wonder if everybody takes as much care as they should when fitting up a cam box. I am explaining, in the accompanying diagram, the methods I have been using when doing this.

At *A* is a bottom end cam (left side). *C* is a bottom end cam (right side). *B* is the bottom center cam. It is very important that *A* and *C* fit perfectly at *H* and *I*.

When the needles pass *J*, which is the bottom or point of *E* (*E* being the left-hand stitch cam), there must not be too much play between *J* and the point of the bottom end cam where it fits into *H*. The same thing applies to the right-hand side. *J* and *K* should be as wide as the bars in the cylinder.



An accurate way to determine that the cams *E* and *F* are the same length is to take a pair of thread calipers and caliper from the top of the ring to *J* and *K*.

Needless to say the faces of the cams have to be kept smooth and when polishing the slopes on *A* and *C* that gives too much play for the needle butt, remove, say, *A* and grind a little from the top only at point *N*.

After replacing the cam after grinding, tap on cam at *P*, try the needle, and cams can be saved by doing this. (I am not showing the top center cam, but believe I have shown the main parts.)

D and *G* are switch cams. Some use a pin and spring on these, but I prefer just a spring because the pins will brad on the ends and the cams can't work; consequently, break-downs occur. The V-block that couples to the plunger in the carrier stand sometimes becomes loose causing trouble. If the block is brazed to the ring, that worry is eliminated for all time. W. H. H. (GA.)

Lining Up the Double Sole on One Needle.

EDITOR COTTON:

In answer to "G. B. F. (Tenn.)" on lining up double sole on Banner machines, I will submit the following:

It is an understood fact that it is necessary to have all needles perfectly straight and to see that the yarn finger is not "pitted." I would suggest that the yarn finger be taken off and examined to see whether there is a slight ridge worn in bottom of the hole. It may be necessary to use a magnifying glass to see it. Have the spring on the yarn finger just tight enough to drop the finger each time and see that it does it.

Do not have the yarn feeding too freely. A very slight tension on double sole yarn will help.

It is possible that "G. B. F." is using a hard twisted yarn in his double sole, and the harshness and twist may have something to do with it. He might try a cone not weighing over one pound on his double sole.

I should like to have "G. B. F." tell us through "Knitting Kinks" how he makes out on this problem.

BOB (CANADA)

The Use of Special Mixtures in Dyeing.

(*Continued from page* 419.)

immediately matched with colors in stock, the correct amounts of each weighed out and dissolved and added to the dyebath. If the batch, after dyeing, needs a little shading, the colors needed are on hand. There are no delays, the new shade oftentimes being completed in twenty-four hours, the length of time it perhaps would take the mail to reach a dye concern. There are no odds and ends of different mixtures left over, as nothing but straight colors are used and mixed as they are needed. No costly mixtures are used.

If a mill is not of sufficient size to warrant the employment of a man for this sort of work, the next best system is to have the dyestuff companies submit the dyeing formula for a shade in percentages of each color used, and to use standard colors.

This is perhaps not so convenient but is surely more economical, and without a doubt is a system most to be preferred both by the dye companies and the consumers.

FRED DUNCAN has become assistant superintendent at the Dallas (Ga.) Hosiery Mills. C. S. Foster is manager and superintendent.

SAMUEL ALEXANDER MAGILL, 63, president of the Atlanta Hosiery Mills, Atlanta, Ga., died on December 23rd, following an illness of two years. Mr. Magill removed to Atlanta in 1895 from Knoxville, Tenn. He organized the Magill Hosiery Mills, which later became the Atlanta Hosiery Mills. Funeral services were held from the North Avenue Presbyterian church, Atlanta.

The Yarn Market

The past month, as considered in this column, involved two holiday weeks which of course contributed nothing in the way of activity or interest to report. Furthermore, this period witnessed also the turn of a year with its customary inventory and the usual tendency to await developments.

From this standpoint, therefore, the yarn market in Philadelphia appeared as void of anything approaching the radical in operations and price. Marking time is an expression which might well be applied to all factors.

The new year was entered without evidence to warrant undue optimism for the immediate future on the part of dealers, yet there was underlying the conditions a vein of hopefulness for the year. This feeling being based upon the universally expressed belief in 1925 as a good business year, this prediction seeming upheld by the fundamental conditions in this country and abroad as discussed by our leading economists and in our leading business barometers. The more healthy condition in cotton textile circles generally, it was pointed out, is certain to reflect itself back through the channels into the yarn market.

As intimated, nothing of a startling nature was revealed in the trading occurring during the past month, however. It might be mentioned that factors reported less activity this year than last year, but this was attributed to different conditions and described as the resting period before the race or the lull before the storm, if mixed and far-fetched metaphors are permitted. One interesting feature was the conduct of carded yarns and combed peeler yarns, which, according to the expression of one man, were both "on the same road but going in opposite directions" insofar as price and demand were concerned. The former made from the shorter staples of cotton seemed to lack interest or attraction; while the finer combed numbers, coming from cotton of staple of more than an inch and a sixteenth, enjoyed a popularity that resulted in a boosting of rates while the carded counts sagged off some few cents.

This resulted from a belief in the scarcity of the supply available of the longer staple cottons, it was believed, and buyers were anxious to protect themselves; coupled with the stronger position maintained by the staple cotton.

With the exception of fluctuations resulting from cotton actions, however, the market operated on a fairly level basis during the entire month. While nothing extraordinary developed business came in in fair volume, this being fairly well distributed although leaning toward the finer counts. Two customs of former years, it seemed, have departed from market practice—that of buying "long," as has been commented upon, and that of selling "short" to awaken apathetic interest. The efforts of the spinners to eradicate speculation apparently are bearing fruit which will be profitable in the long run. The consumers seem disinterested so far as long-time commitments are concerned, which is declared to indicate more equable distribution of business throughout the year, to the elimination of rush buying periods. The business transacted seemed to be of the piecemeal variety for current consumption, January appearing to be pretty well taken care of, with February requirements to be disposed of during the latter part of the year's first month.

Spinners, whether through their recent organization or by individual efforts, or both, seem to be fairly well "unstocked" of yarns, and pursue what appears to be a conservative policy of curtailment, and dealers' stocks also are reported depleted, except in those instances where the factors took on additional cases on their own account.

Following are quotations on the Philadelphia market on January 15th:

Single Skeins.

4s to 8s	39	10s	39
12s	39	14s	40½
16s	41	20s	42½
24s	45½	26s	46½
30s	48½		

Single Warps.

8s	40	10s	40½
12s	41	14s	41½
16s	42	20s	43½
26s	47	30s	50
40s	54		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slack	40
8s 3-4 hard white warp twist	37½
8s and 9s 3-4 tinged tube	35½
8s 3-4 hard twist waste	34½

Two-Ply Skeins.

8s	40	10s	40½
12s	41	14s	41½
16s	42½	20s	43½
24s	47	26s	47½
30s	49½	40s	54

Two-Ply Warps.

8s	40½	10s	41
12s	41½	14s	42½
16s	43	20s	43½ @44
24s	47½	26s	48½
30s	50 @50½	40s	55

Frame Spun Carded Yarn on Cones.

8s	37½	10s	38
12s	38½	14s	39
16s	40	18s	41
20s	41½	22s	42
24s	43	26s	44½
30s	48	40s	54

30s double carded	48
30s tying-in	47

Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	57	20s	60
24s	61½	30s	67
40s	72½ @75	50s	77½
60s	85 @87½	70s	90 @92½
80s	1.05 @1.07½		

Single Combed Peeler Yarn on Cones.

18s	52½	24s	55
30s	60	36s	65
38s	66	40s	67

Mule Spun Carded Yarn on Cones.

10s	43	12s	44
14s	45	16s	46
18s	47	20s	48
24s	49	26s	50
30s	51	40s	58

Mule Spun Combed Peeler Yarn on Cones.

10s	52	12s	53
14s	54	16s	55
18s	56	20s	57
22s	58	26s	62
28s	63	30s	64
36s	67	38s	70
40s	72		

Practically 80 per cent of the firms whose exhibits have appeared in previous shows will be present with displays at the 21st Knitting Arts Exhibition, to be held in the Commercial Museum, Philadelphia, Pa., from April 6th to 10th inclusive, according to announcement from Chester I. Campbell, general manager in charge of the exhibition. All plans are being made to make the show unusually successful from the standpoint of a "business-producer."

A definite program for the convention of the National Association of Hosiery & Underwear Manufacturers, to be held during Show Week, has not been announced, but it is certain features of strong interest will be scheduled. Information on this point doubtless will be sent out soon by John Nash McCullaugh, National Secretary of the association. An unusually good attendance from the South seems in prospect, in addition to the members from other sections of the country.

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Developments have been carried to a point where it is acknowledged that Universal packages for these various purposes afford the best deliveries, the winding machines have proved to be the most economical from operative and cost standpoint, and in addition to developing machines and attachments, the Universal Winding Company is prepared through its engineers to give expert advice and assistance in regard to handling the material.

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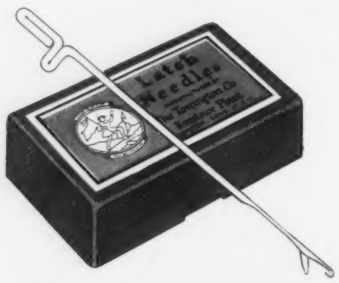
They are the time-tested thoroughbreds of the latch needle world. Their temper is right, their uniformity famous throughout the trade. And Excelsior-Torrington construction is noted for perfect design and execution. Smoothness and strength complete the list of advantages offered knitters by Excelsior-Torrington Latch needles—known all over the world for quality.



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The Knit Goods Market

Theoretically, there is some activity in the hosiery primary markets. All interests are optimistic. But most jobbers are buying as if tinctured with pessimism, and manufacturers are contracting for raw materials with a degree of conservatism. This applies with equal force to practically all knitted goods, and emphatically so in relation to certain other textile lines.

Briskness in hosiery is confined more particularly to men's novelties for spring and summer, women's silk for the Easter holiday trade and, to some extent, hosiery of silk and wool in combination, for fall. Staples are not in the active class. Mills making juvenile lines are, in the main, busy with orders placed last year.

There is much talk of price advances on silk and mercerized lines—more talk than actual increases in price. Buyers, schooled in resisting values in a rising market, are passing up some apparent bargains in strong, well established lines. They want 1925 values at 1924 prices. Some manufacturers are standing pat on their recent revisions; some are not.

A buyer for a well known jobbing house liked a North Carolina line of fiber plaited hosiery, but he did not like the price. "I can buy a similar stocking at 12½ cents a dozen under your price," he said to a mill agent. "I would advise you to buy it," he was told. "I believe your house is in business for profit, just as my mill is. There would be no profit at the price you mention. Do your buying from the mill that is not operating for profit. Perhaps your policy will help to wreck it; then there will be easier sailing for those that are."

This seller got the order. He had the goods and knew it, and was not to be bluffed. A less resourceful, more pliant mill agent would have lost it or shaded the price. While there is some weakness among certain mill representatives, it is suspected that most of the low priced hosiery used by buyers for purposes of price comparisons is inferior stuff, as is well illustrated in artificial silk goods. Although buyers may indicate a strong preference for high standard lines they are attracted to the trashy by price, and it is no secret that the latter has operated to the disadvantage of mills building hosiery for quality rather than price.

A manufacturer whose production is sold by one of the better commission houses is getting $12.75 a dozen for a 42 gauge, 11 strand, standard length boot, full fashioned silk stocking. When the line was under discussion the mill was asked simply to produce such a stocking. Price was not mentioned until samples were shown and the exact cost stated. Then it was priced and is selling. Another manufacturer, making a kindred line, with the idea in mind of meeting a competitor's quotation, has devised a plan for reducing cost without, really, impairing the wearing quality of the stocking, yet making it appear what it is not.

The two mills referred to are selling their production and getting a profit. Both, therefore, are pursuing a policy that, from the viewpoint of honest gain, is not to be adversely criticized. The self-assumed "clever" buyer wilfully closes his eyes to the difference in construction when he compares prices and makes it appear he expects to get the more meritorious bit of hosiery at the price of the inferior. When he meets his match in the person of a seller he is left to make his choice and pay the bill.

Most of the really big, substantial, full fashioned silk hosiery mills have sold more goods for the coming season than to the corresponding date a year ago. They have booked more orders and the more important jobbers have bought further ahead, so that numbers of mills are well supplied with business, some getting slight advances on last fall's prices. No array of novelties, it appears, can break in on silk hosiery as a staple, and it looks as though the full fashioned is making gains on the stocking of seamless construction. For one reason, it has been better exploited and, it seems, there was wider opportunity for eliminating certain extravagances in manufacture by which the price gap between the two has been narrowed. Then, too, change in construction has operated to the benefit of pioneers in innovations for reducing cost without disturbing quality standards.

A Chipman stocking, with a full fashioned foot and seamless knitted leg has made a hit as a dollar seller, a better stocking in the same class being sold in retail stores for a quarter more. This is called the form fashioned stocking. Another mill goes this one better by knitting the foot and entire silk portion of the leg on flat machines and the mercerized hem on circular machines. The completed hose shows the seam from toe to top of leg and is the nearest approach to a full fashioned stocking involving seamless build in part that has been attained.

Until producers of artificial silk came out with their price lists for the current contracting period there was no little uneasiness among manufacturers and distributors of hosiery of which the fiber is largely a component part. While it was being predicted prices of artificial silk yarn would be advanced, many mills were selling for future as though covered for their requirements or confident there would be no change in price. A few mills were declining orders for deliveries two months later, and one suggested adjusting price, at delivery time, to whatever change might have been made in the cost of the raw material. This plan did not work out, as buyers said they would have nothing to lose by waiting; that they would either buy now at a flat price or defer making commitments until they could do so.

While the new prices for artificial silk were still a matter of speculation and grave concern, mills were puzzled over the market for Japan silk, and many were buying for only immediate needs, little contracting for March and beyond being reported. A few still were working on raw silk bought at very low prices; nearly all were near the end of their resources. With New York warehouses containing larger stocks of silk in January than for some years, there lurked the suspicion the market would decline. It did, but the recessions were not all that was looked for. Interests taking a bullish view said that silk, having moved to importers, was in stronger hands than if still controlled by reelers and that, therefore, it was more likely price lists would be closely adhered to. Against this is the presumption that if Japan cannot move her silk, prices in the original market will be cut and force a reduction here. It was a purely speculative situation for consumers of silk, and with hosiery

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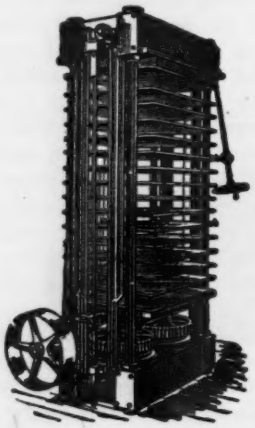

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priced down and considerable having been sold, there was reluctance to buy much silk at the then current prices.

Novelty hosiery for men is in strong demand. Of certain fetching types there is call for more than mills can deliver in good time for the spring and summer season, and buyers are paying profitable prices. It would be difficult to single out any one line as stronger than others, but anything in cleverly arranged colored stripes goes, and a fiber plaited sock with resist stripe is in especially good favor among buyers for jobbers. Some lines carry both vertical and horizontal stripes. The latter, alone, are having a good response from buyers. A mill number in plain colors, light shades almost exclusively, is of tram and artificial silk and goes to jobbers at $3 a dozen. It is being bought freely for the future.

Plain mercerized half hose shows little, if any, improvement after a long period of comparative weakness. But at prices at which it is available it is keeping high grade combed goods in the background. It is not easy to sell high grade, double sole, combed socks at $1.65 in competition with mercerized but 15 cents higher. A manufacturer recently put on the market a coarse gauge mercerized sock with plain cotton top at 90 cents a dozen to jobbers. Whether it has gotten beyond the sample stage could not be ascertained. The trade says it is not likely to find a very wide outlet.

Women's plain mercerized is in little better demand, and prices continue so low that it is a question whether mills are getting much more than cost out of them. They are hardly competitors with the ribbed-to-toe and mercerized in combination with artificial silk. It is understood a large unsold lot of plain mercerized has been printed in novelty patterns, and so embellished, is expected to move profitably.

In the full range of hosiery there are three outstanding types of construction that appeal. They are silk, ribbed and drop-stitch to toe, and sports and athletic goods, and it would be not inappropriate to include all-artificial silk and the fiber in twist or plaited on. The ribbed-to-toe type is especially a leader in misses' hose, in both plain, full length and seven-eighths length, with jacquard or Brinton stitch tops. The plain full length ribs are shown in a variety of light shades and make an appeal, for both the coming season and for next winter, in wool and artificial silk in combination.

There is no little interest in so-called wool hosiery for men and juveniles for fall and winter, and an Eastern mill making women's lines having the ribs carried to the toe reinforcement is operating 22 hours a day, while a manufacturer of children's fancy top ribs for the coming season is running the plant on a three-shift eight-hour basis. Both, of course, are shipping out a large part of their production, as well as being engaged for fall. Women's wool hose in two-color tone is proving a good proposition for some manufacturers. Most of the pattern hosiery shows light background.

From the standpoint of mill activity, infants' socks are perhaps in the stronger position. Some mills have sold up to May and beyond, and more than one has declined immediate delivery orders. It appears that as re-orders come in the socks will be scarce, as they were in the spring of several recent years. They are among the more profitable lines for merchants, yet many jobbers have been slow to place orders for a fair part of their requirements and now are beginning to pay the penalty. There is a like situation, not so pronounced, perhaps, in misses' sports and novelty lines, the popularity of which has left staple combed and carded ribs in a weak market position.

Misses' plain combed ribs of 300 needles are quoted all the way from $1.55 to $1.65 a dozen, and a large lot was moved to a chain store some weeks ago at even a slightly lower price than the bottom of the range mentioned. Probably this line's sharpest competitor is the full length ribbed-to-toe. Misses' mercerized staples also have so dwindled in favor that some few mills have discontinued their manufacture. Novelties, sports goods and improvement in construction have gone far in the revolutionizing of hosiery manufacture in the last several years, yet seem to have but made a good beginning in that direction. There remains a good market for low end cotton hosiery other than misses' coarse gauge ribs—a better market for the fewer mills concentrating on the low end, a number of the smaller establishments having given it up as unprofitable.

Several of the southern mills making cheap cotton stockings appear to be making and selling more than ever. This may be ascribed to diminished output elsewhere by reason of mills surrendering to strong concerns. It is stated the Rome (Ga.) Hosiery Mills had a larger volume of business in the last four months of 1924 than in any similar period. This information was vouchsafed by an executive of the company on the occasion of a recent visit to New York. It is understood that Alden Mills and the National Hosiery Mills, both in New Orleans, also are having a good run, as are several manufacturers in the Adamstown section of Pennsylvania, where wage scales some time ago were adjusted to a basis making it more nearly possible for these mills to compete with their large rivals in the South.

Referring to novelties, the Orion Knitting Mills, Kinston, N. C., shows a woman's stocking with the pineapple stitch to the toe reinforcement, as an improvement on the fancy stitch to the ankle only. The pineapple stitch has been a winner in men's, women's and children's hosiery, more particularly in the latter two classes. The stocking now is being described by some mills as cross ribbed. It is promising of a good season by either term.

The hosiery market situation is a better one than at the outstart of the year. Most jobbers had bought for only two months' needs. By the end of January they were contracting into April, for general lines. It is believed conditions will be fairly stable unless mills, enthusiastic over the improved situation, speed up and glut the market. Strictly A-1 hosiery probably will not be overproduced, but with the inroads being made by novelties it might prove a costly blunder to accumulate stocks of staples.

Underwear.

A fair measure of briskness developed in the underwear primary market last month with the arrival of many buyers for the annual meeting of the Jobbers' Association of Knit Goods Buyers. Prior to that many of the northern mills had not been booking the expected volume of orders for heavy weights. The situation was better, however, than at the corresponding period of 1924, when jobbers were bucking prices. This year there is heard little objection to values as represented in manufacturers' quotations.

Jobbers admit they regard underwear priced fairly—on the basis of cotton down near 20 cents, a level to which they do not look for it to decline. Any recession in cotton, leading buyers have said, would not drag underwear

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April 6, 7, 8, 9, 10, 1925

Twenty-first Annual
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prices down. Merchandise, therefore, looks like a safe asset. The one fly in the ointment is the fear that retailers will adhere to their policy of last year—taking goods in late and for needs as they develop during the season.

Jobbers point out that between the time of their contracts and September next, when shipments to retailers, it is thought, will commence, several things to affect them adversely might happen, and that possibly the worst would be retailer resistance to prices, which, after all, has stood in the way of freer jobber operation in the primary markets. The situation in this respect is covered in the Market Service Letter of the National Wholesale Dry Goods Association, which says:

"The opinion that 'higher' prices will check business is based on experiences of the past. This view is widely accepted throughout the wholesale trade and endorsed in the primary markets, where sellers look for a stiffening on some constructions, but are fearful of results."

It will be noted the word "higher" is used in relation to prices. This may be regarded as a warning to manufacturers that advances will be followed by reprisals. To this writing only one mill—in the Mohawk Valley—has announced an advance, and that mill's price at the opening was regarded so low as to excite comment among jobbers as well as manufacturers. With this exception prices have remained where they originally were put. Advances might come if distributors deferred commitments so long that mills could exact a premium for spot deliveries. Such a stage was approached last December, when jobbers were calling for drop shipments by express. Mills, however, took no advantage of the situation, which was not of their making, and the season closed with all interests feeling they had pulled through the year better than it was feared they might.

As this year began with dealers bins and shelves empty, in contrast with carryover stocks from the winter of 1923-4, there seems little doubt that 1925 will compensate for the shortcomings of last year. From the manufacturer viewpoint, this reasoning is being visualized in the volume of business placed with the southern mills which came on the market with prices more than a month before most of the mills in the North. From persons close to the Appalachian and Standard mills in Knoxville, Tenn., it is learned that the bookings are well ahead of those to the end of the first month of 1924. One is said to have but about two months production to sell for the delivery period ending with October. Both are pretty well sold up for the periods ending April and July.

It is understood the P. H. Hanes Knitting Co., Winston-Salem, N. C., has sold its first three months' output and is well supplied with orders for succeeding delivery periods of three months each, this applying to several pivotal numbers of both union suits and shirts, other mills in the South making heavy weight cotton ribbed goods also are reported having taken satisfactory business. As the southern manufacturers were the first to come on the market they are believed to have gotten a large part of the cream of the early delivery business, taken at especially attractive prices.

Trading with the northern mills, with a few exceptions, did not get into full swing until after the post-holiday lull. Toward the end of January orders were being placed quite freely. But most of the mills in the North still have a far greater part of their production to be contracted for than have their competitors in the South. Among the exceptions, it may be stated, are The Atlas Underwear Co. and The Piqua Hosiery Co., both in Piqua, O., and both making what are viewed as somewhat distinctive lines. These mills, credited with having a year-after-year clintele, pursued the customary policy and opened when the managements believed jobbers were ready to buy and the time ripe for active selling.

A person speaking for the Atlas Underwear Co. said: "Despite subnormal conditions existing in the textile trades, our production last year was the largest in our history, and we are expanding one of our plants—that at Richmond, Ind. At the rate we are booked on summer weights, it looks as though our business in this division this year will run far ahead of 1924." One large mill is known to have declined several new accounts, preferring that first thought be given to the probable requirements of patrons of previous seasons.

Thus it appears that underwear jobbers—at least a large part of them—look forward with more confidence than they confessed to last year. The South has bought conservatively, according to manufacturers speaking of the sections where the greater volume of their business came from. From Chicago to the Pacific Coast sizeable contracts have been received by mills. The only really weak spot—and that has been weaker than at present—is industrial New England, where wage reductions, rumors of more to come and sporadic strikes have had, obviously, a depressing influence on jobbers and retailers. It was believed the situation there was being cleared up, however, as several houses concerning whose early orders some doubt had been entertained, have placed contracts for moderate amounts. Jobbers in Philadelphia and Baltimore are said to be a pace or two behind many of those in the West in the size of their contracts.

While women's heavy weight underwear was a scarce article in many retail stores in December and January, orders for next winter are not in as large volume, relatively, as for men's cotton garments. Woolen underwear for men has been taken on a very conservative basis by most jobbers, who say the woolen garments figure as only a small per cent of their business in underwear.

This month is expected to disclose retailer attitude toward men's light weight underwear. Road men for jobbers and mills selling direct will be on touring the trade, keyed up for business. As some jobbers last month were anticipating deliveries, it is believed there already had been some substantial retailer buying, with department stores still to be heard from.

It is thought in some quarters that the extensive use of artificial silk for striping nainsook athletic suits may operate to the disadvantage of both bal briggan and cotton ribbed underwear. Mills are consuming very large quantities of artificial silk for improving the appearance of men's underwear, and manufacturers of the knitted garments, it is admitted, are facing keen competition, in which they will be more successful if they too make freer use of the fiber, which opens a way for putting class into garments made from combed and mercerized yarns. It looks as though artificial silk for underwear is destined to become as popular as for hosiery purposes.

The inroads made on women's light weight cotton underwear by Japan silk garments have been further extended since manufacturers have been combining artificial silk with

tram, and especially has the industry in the Schuylkill Valley district of Pennsylvania suffered by the innovation. Only a few of the cotton underwear mills in this territory are reported booked up for more than a month or two, while silk mills are busy.

As a broad proposition the cotton underwear industry has scored important gains over last year. It has made a good start in 1925, and the outlook is for price steadiness and an improving volume of business as merchants become acclimated to market conditions.

Manufacturers of sweaters appear to be at the turning of the ways. They seem to have sold up so far as they were covered for their wool requirements at what now look like low prices, and must figure on revisions to conform to an increase of at least 20 per cent in worsted yarns, comparing with the summer of last year. A line of men's heavy weight sweater coats will have to be advanced around $12 a dozen to retailers, figuring on current yarn cost. Thus far prices have not been moved up, and one mill is quoting a dollar a dozen less than last year. A line of boys cotton sweaters has been advanced 50 cents a dozen.

There has been fair jobber buying of certain popular styles of sweaters, at former prices. Business in staples has been lagging, and there is no hope for early improvement in worsted lines as at present constructed unless there be a recession in yarns. Some mills still are busy on initial orders; most of them could accommodate more business.

Among the Knitting Mills

The Parks Hosiery Mills, Asheboro, N. C., have been organized with a capital of $200,000, by Hugh Parks and others. Work on the plant will be started soon, and a two-story brick building, 100 x 60 feet, will be erected. The initial installation will include about 50 knitting machines.

Hosiers, Ltd., have completed a $40,000 addition to their plant in Woodstock, Ontario. The basement of the new addition is used as a warehouse, while the main floor contains the company's office, a stock room and the shipping room. The upper floor houses winding room and inspection department. In the rear a fire-proof dyehouse is located.

McEwen Knitting Mills Co., Burlington, N. C., has been organized by J. H. McEwen, B. Y. May, and W. K. Holt, of Burlington. Mr. McEwen formerly was secretary-treasurer of the Charlotte Knitting Mills, at Charlotte, N. C. Mr. May is secretary of the May Hosiery Mills, Burlington. Twenty machines will be located in the Hatch building, in Burlington, and ladies' silk hosiery will be the product of the new concern. The capital is $100,000.

Washington Hosiery Mills, Nashville, Tenn., have let contract for a brick addition, two stories. to cost $18,000.

Dallas Hosiery Mills, Dallas, Ga., have ordered new machinery which will approximately double the capacity of the dyehouse.

Construction work is progressing on the new two-story plant of the Evenknit Hosiery Mills, at Bay City, Michigan.

The Wolverine Knitting Mills, Inc., Bay City, Mich., has arranged for an increase in capital from $50,000 to $75,000, for general expansion. The company is said to be planning for early increased output.

Brummell & Mendelson, Inc., New York, N. Y., has been formed under state laws with a capital of $400,000, and will operate a local knitting mill for the manufacture of hosiery and other knit goods. Arrangements will be perfected at an early date. The company is headed by S. F. Rosenthal, T. Levin and H. Goodman, and is represented by A. B. Albert, 305 Broadway, New York.

The Kinderhook (N. Y.) Knitting Co. has filed notice of increase in capital from $40,000 to $235,000, a portion of the proceeds to be used for expansion.

The Puritan Knitting Mills, Inc., Philadelphia, Pa., recently formed under state laws with a capital of $200,000, will operate a local plant, for which arrangements will be perfected at an early date. F. M. Titleman, 5405 Gainor Road, Philadelphia, has been elected treasurer of the new company.

Officials of the Thieme Brothers Co., Fort Wayne, Ind., manufacturer of hosiery, etc., have formed a new company to be operated as a subsidiary, under the name of the Thieme Hosiery Co., capitalized at $1,000,000.

The Star Knitting Mills, Inc., Paterson, N. J., lately organized with a capital of $100,000, will operate a local mill. It is purposed to begin operations at an early date. The new company is headed by L. E. Saperstein and B. Moran; it is represented by Emanuel Shavick, 140 Market Street, Paterson.

A. Lubasch & Sons, Inc., New York, N. Y., has been formed under state laws with a capital of $50,000, to operate a local knitting mill, for which arrangements will be consummated at an early date. The company is headed by A. and J. Lubasch, and is represented by Hymans & Hymans, 334 Fifth Avenue, New York.

The Sagamore Hosiery Co., 56 Washington Street, Providence, R. I., has filed notice of organization to operate a local plant. Edward I. Creamer, 28 Selkirk Road, Providence, heads the company and will be in charge of operations.

The Severn Hosiery Mills, Inc., Baltimore, Md., has arranged for a lease of space in the building at 232 West Baltimore Street, for a local plant, and purposes to begin operations at an early date.

The H. B. Knitwear Co., New York, recently organized with a capital of $40,000, will operate a local mill, for which arrangements will be perfected at an early date. The company is headed by B. de Bragga, S. and K. Hoffman; it is represented by O. M. Gabler, 2949 Myrtle Avenue, Brooklyn, N. Y.

The Jantzen Knitting Mills, Portland, Ore., will be interested in a new knitting mill to be established in an existing building by John Weisner, formerly connected with the Jantzen company, with local mill on the Sandy Boulevard. It is proposed to begin operations at an early date. A list of machinery to be installed in the plant has been arranged. The mill will specialize in the manufacture of outer knit goods.

The Win-Sum Knitwear Co., New York, N. Y., recently organized, will operate a local mill. The company is capitalized at $50,000 and is headed by L. Feldman and O. Mintz. It is represented by A. H. Friesner, 277 Broadway, New York.

The Mitchell & Frank Knitting Mills, Inc., Buffalo, N. Y., is said to be arranging for early increase in capacity

FALLS

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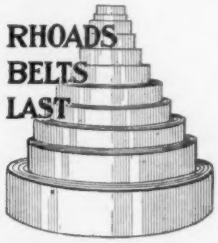

TANNATE LEATHER BELTING

INCREASES YOUR OUTPUT

A MILL owner says of his Tannate Belt, "I do not believe any load could make it slip. It has paid for itself twice over."

The unusual pull of Tannate is a big thing on your more difficult or more particular drives. For it means increased output and often better quality because of the steady even running of your machines.

It is output that counts, and Tannate Belts help you to maximum output. That is what this mill man means when he says the belt has paid for itself twice over.

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Keep Labor Turnover At the Minimum

It will help solve the annoying problem of labor turnover to plant Peach Trees in the yards of your mill village homes. The delicious fruit is a health-giving diet, the bright foliage and blossoms bring beauty, two essentials of right living reflected in contented operatives' efficiency and greater production.

We supply hardy varieties that bear fruit from early Summer until late Fall, when correct diet is most necessary. Special prices on lots of 500, 1000 or more.

This is one of the best times of the year to Plant Peach Trees.

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at its plant. The company recently increased its capital from $150,000, to $250,000, a portion of the fund to be used for expansion.

The Hogle Knitting Co., Inc., Bay City, Mich., recently chartered under state laws, plans for the operation of a local mill. The company is headed by M. E. Hogle, and Edwin A. Hull, with registered office at 813 North Jackson Street, Bay City, in charge of the first noted company official.

The Bangor Hosiery Co., Bangor, Pa., has been formed under state laws with a capital of $200,000, to operate a knitting mill in this section, for which plans will be consummated at an early date. Ray S. Davey, Bangor, is treasurer of the company.

The Elk Knitting Mills, 5 La Grange Street, Brooklyn, N. Y., are said to be planning for the early re-establishment of their plant, with the replacement of a portion of the plant recently destroyed by fire, including additional equipment.

The Standard Knitting Co., Jersey City, N. J., has filed notice of company organization to operate a local plant, with headquarters at 90 Oakland Avenue. C. W. Blatt and associates head the company.

The Wisaka Textile Mills, Inc.. New York, N. Y., has been formed under state laws with a capital of $50,000, to operate a local plant for the manufacture of outer knitwear, for which arrangements will soon be perfected. The company is headed by C. A. Oberle, C. L. O'Connor and R. Solomon; and is represented by S. Shapiro, 265 Fifth Avenue, New York.

Ander & Co., Inc., Brooklyn, N. Y., has been chartered under state laws to operate a local plant for the manufacture of knit goods. Arrangement for the mill will be made at an early date. The company is headed by D. Ander. B. and J. S. Steiner. It is represented by B. S. Deutsch, 261 Broadway, New York.

The Braun Brothers Corporation, Linden, N. J., has arranged for a change of company name to the Linden Knitting Mills, Inc., and is said to be planning for expansion in operations.

The P. H. Hanes Knitting Co., Winston-Salem, N. C., has re-engaged C. W. Godwin as manager of the company's New York office, 366 Broadway, the change dating from January 1. Mr. Godwin occupied the same position until several years ago, when he resigned to take charge of the New York office of the Oneita Knitting Mills, Utica, N. Y., underwear, a connection which he relinquished to return to the P. H. Hanes Knitting Co.

J. P. Quinlan, New York, has been appointed selling agent for the National Hosiery Mills, New Orleans.

A banquet was had at the Arkwright Club, New York, January 27, in observance of the completion of the Knit Goods Building at 99 Worth Street. Although work on the 13-story structure was not commenced until the spring of 1924, the building was ready for occupancy on February 1, and 80 per cent of the 180 offices were rented and most of them occupied. Erection of the building was the direct outcome of the tenants on the tenth floor of 346 Broadway receiving notice in October, 1923, that they must vacate, as the owner of the building, the New York Life Insurance Co., desired to occupy it. The enterprise had its inception at a meeting of knit goods mill representatives affected by the notice, who were called together by Abe Louis, vice-president and New York manager of the Atlas Underwear Co., who is credited with a large part of the success in making haste for procuring a down-town headquarters for the tenants then soon to be left commercially homeless.

The Attix Hosiery Mills of Knoxville, Tenn., manufacturers of the "E. D. Attix" brand high quality silk boot, ladies' and men's hose have recently moved into their new home at 504-508 Morgan Street, Knoxville, Tenn.

Increases in the Use of Artificial Silk.

Producers of artificial silk look for a large increase in domestic output and consumption by American mills this year. Last year's consumption was estimated at close to 42,000,000 pounds, of which, it was believed, almost 20,000,000 pounds were used in the hosiery, underwear, sweater and other divisions of the knitting industry. The larger gains in consumption are in underwear, in which there was consumed in 1919 only 93,000 pounds and about 200,000 pounds in 1923. according to approximately accurate statistics.

According to the only statistics available, the total consumption of artificial silk in the United States in 1912, the earliest year for which trustworthy figures are obtainable, was around 800,000 pounds, of which 59 per cent was imported. Of the 1924 consumption of about 42,000,000 pounds, only 10 per cent was imported, it is stated by a person speaking for one of the larger American producers. It is believed there will be consumed in American mills this year close to 50,000,000 pounds and that not more than 10 per cent will be of foreign manufacture. The hosiery mills of the United States are shown in government reports to have used 8,668,000 pounds of artificial silk in 1923 Figures for last year were not accessible at the time this was written, in January. The increase in its use for hosiery purposes in two years is shown in the following tabulation of hosiery output in dozen pairs, taken from industrial census statistics:

	1919	1921
All-artificial silk	740,804	1,595,988
Art. Silk in combination 10,575,741		13,902,255

Leading producers of artificial silk are the Tubize Artificial Silk Company of America, specializing in 60, 70, 80 and 90 denier; the Viscose Co., Du Pont Fibre Silk Co., American Celulose and Chemical Co., plant at Ameelle, Md.; Belamose Co., new plant near Hartford, Conn.; Industrial Fibre Corporation, Lustron Co., and Cupra, Inc.

Only one of the companies, it will be observed, uses the term "artificial silk" in the corporate title. The Tubize Co. never says rayon, and that is the only term used by the Viscose Co. It is stated that Japan silk interests prefer that the word "silk" be not used as a part of the descriptive term for the man-created fiber.

The American Laundry Machinery Company, Cincinnati, Ohio, has issued a catalog recently including descriptive and illustrative material on their line of textile machinery—including the well-known "American" equipment of rotary dyeing, bleaching, fulling, scouring and washing machines, hydro-extractors, rotary hosiery presses and dye kettles.